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## THE ROTUNDA HOSPITAL TWO HUNDRED YEARS OF MIDWIFERY THE BICENTENARY OF THE ROTUNDA HOSPITAL

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THE factors which have favoured the advances in medical science generally during the past two hundred years are many and varied. When we consider the effect of the establishment of maternity hospitals it becomes apparent that the general advance in knowledge that accompanies experience of dealing with a large series of cases was gained, but that problems such as puerperal sepsis and neonatal infections assumed ghastly proportions in comparison to their incidence in purely domiciliary midwifery. Certain names stand out in the history of medicine due to the mark that a man has made by his original contributions, and rightly so; others who have perhaps not been so prominent in this manner have, by steadily accumulating knowledge and by teaching, benefited their profession. In the period under review Francis Ramsbotham deserves greater recognition than he has received. Whereas Smellie was the leader of obstetric teaching in the 18th century, Ramsbotham dominated the middle of the 19th century. It was in 1839 that he published "The Principles and Practice of Obstetric Medicine and Surgery", which any modern obstetrician may read with great pleasure and benefit.

Bartholomew Mosse founded the Rotunda Hospital in 1745, realizing the urgent need that existed to succour the poor women of Dublin and their infants. Since that year a gradual and sometimes painfully slow improvement has taken place in the practice of obstetrics in the Rotunda and the world over.

### THE 18TH CENTURY

In an old case book, which I found amongst the records of the Rotunda Hospital, are notes of 149 cases under the following heading:—

"A Journal of my Practice in Midwifery from my first studying that Branch under Dr. W. Smellie in London, 1748":

The initials in this book are D.M.B. and it must have belonged to Dr. David McBride, who is alluded to by McClintock in the following terms:

"Dr. McBride was an eminent practitioner of medicine and midwifery in Dublin during the middle of the last century. He was born in the County Antrim in 1726 and died at his residence, Cavendish Row, Dublin, in 1778. He published several original essays on subjects connected with chemistry and especially pneumatic

chemistry, in which department he made some valuable discoveries; and was the author of a large treatise on the 'Practice of Medicine'. As an accoucheur he was much employed, and his fee book shows that he attended 1,065 midwifery cases from 1767 to 1777, inclusive. As I have elsewhere mentioned, Dr. McBride was the first British author to describe pudendal hæmatocele. He also gave lectures on the practice of physic at his own house. Such was his reputation in Dublin as an obstetric physician, that he was elected a governor of the lying-in hospital in the year 1774, and requested by the Master and Board to give lectures in the hospital upon midwifery and the diseases of women and children. Those of his first course were published in London in 1772, and were subsequently translated into Latin and published at Utrecht in 2 vols. octavo. (For a full account of the life and writings of this eminent physician, the reader is referred to the third volume of *The Dublin Quarterly Journal of Medical Science*, p. 281.)"

The following histories are taken from McBride's case book:—

"Poor Woman in Hamon Lane, July, 1754. In the 7th Month she had very large discharges of Blood for a fortnight past, which sometimes used to cease and then return with greater violence. Finding her very much weakened and fearing lest another return of the flooding might carry her off before anyone could get to her Assistance, I gradually opened the Os Internum, and brought the Child by the feet—she did well".

We have in this case history the outlines of the treatment of placenta prævia which afterwards came to bear the name of Braxton Hicks.

"Mrs. Agoni, 22nd Oct., 1754. Dr. M. attended her but being entirely worn out, I was sent to together with Dr. H. She was in ye seventh month had been flooding at times for 2 months. The lower parts of ye Child had been got away but the head and breast remained behind, the Uterus closely contracted and no pains... After much ineffectual toil, it was agreed to give an opiate and leave it to nature, which had so good an effect that in six hours pains came on and sent off the remainder of the Foetus which was greatly putrefied. A large Cake of Coagulated blood came off before Dr. M. came which he at first took for a putrefied Placenta".

"Poor Woman in Church Street, 30th Sep., 1755. The Midwife told me the Breech presented but on examination found it was the face—the chin being towards the left os Ischium. I first endeavoured by pushing up the head to bring the Vertex to present but could not accomplish it—then I attempted to turn and deliver by the feet, but could not do that neither the Uterus contracting so strongly. I then introduced the forceps along the Ears, turned the Chin in under the arch of the Pubis and brought the head out with a round turn—the child was dead but I believe if I had applied the forceps at first I might have saved it—shall do so in future".

*The use of forceps.*—It is interesting to note that McBride is advocating the use of forceps for rotation of the foetal head in 1755. According to McClintock, Smellie himself was ignorant of the use of the instrument up to 1733, but in 1746 he was conversant with the forceps and their use. It was in 1752 that Smellie lengthened the forceps and gave them the second or pelvic curve, but he did not himself take credit for this improvement. He states they were contrived by himself "as well as other practitioners on purpose to take a better hold of the head when presenting and high up in the pelvis". Dr. McBride, through having studied with Smellie in 1748, carried with him to Dublin the skill and experience which must have influenced the development of midwifery in Dublin.

"Nurse Bryan's Daut, 1759. In the fifth month was Seized with violent Convulsions which were preceded by an almost total loss of Sight and violent pain in the Head. These fits held her off and on for five or six weeks, towards the latter end of

which her Belly and legs swelled to a great size, a Dropsical Swelling. Her feet were Scarified and great quantity of water run off which lessened the Swelling of the Belly. While she was thus swelled she had no Convulsions but her sight still remained very dim. Never hitherto had she felt any thing like labour pains—at length she fell into a kind of weak Labour and the Midwife sent to me, and I found the Os Internum open and the head presenting, but as she was greatly reduced I thought it would be in vain to wait for the pains and apprehending she might be delivered with the utmost ease, I immediately set about turning and delivering—but it was not till after a full hour's labour that I could accomplish it, for the Uterus constantly gave way before my hand so that I could hardly get my hand into the Uterus—when I did get it there the Child was quite putrid and ye body parted from the head—however as it was but small I got the head in my hand and brought it away after some fatigue. The Uterus still gave way before my hand and retreated quite up into the Belly as it were. I could not imagine how this should happen till after I had brought away every thing on putting up my hand I found the Uterus fairly torn from the Vagina at the back part. This amazed me still the more as I had wrought with the utmost Caution as I thought and used very little force. She died in half an hour. I was immensely shocked that I should have interfered and not rather have left her to the pains, which I certainly should have done, as there was at the time I saw her no urgent necessity for delivering her. But I thought her delivery was the luckiest thing that could have happened to her and so it certainly would have proved if she had either been left to Nature, or it could have been done without injury. Every Labour and abortion should be trusted to the Natural pains, unless something urgent requires the assistance of the hand”.

*Puerperal sepsis.*—A perusal of the Master of the Rotunda's Ward Book for 1793 and the subsequent few years shows the terrible toll taken by puerperal sepsis and typhus fever, and how often craniotomy was done. In addition, a high proportion of the cases in which convulsions occurred are reported to have died. However, the forceps, which were used very seldom, were associated with good results and ante-partum hæmorrhage was successfully treated by version and extraction. Some typical notes are appended:—

“Biddy McGuire admitted to hospital on 13th November, 1793, delivered on the 17th November. Bones of the head broke down by the labour pains. Head perforated and extracted with the Crotchet, died on the 27th November”.

“Elicia Byrn admitted to hospital and delivered 7th December. Discharged 18th December. Placenta presented eight month of Pregnancy. Considerable hæmorrhage before delivery. Child turned and extracted by feet”. (Both mother and baby recovered.)

“Mary Kearny admitted 19th January, 1794. Delivered 21st January. Head perforated and extracted with the Crotchet”. (Mother recovered.)

“Cath Byrn admitted 22nd February, 1794. Delivered 23rd Feb. Died on 28th. Typhus before admission”.

“Biddy Grogan admitted 27th Feb., 1794, delivered 28th Feb. was attacked on the 7th January with violent pain in the umbilicus attended with constant vomiting. Died on the 8th Jan. Had several slight attacks of similar kind since delivery which were constantly relieved by purgatives—to have 1/1 to carry child to work-house”. (Puerperal sepsis with terminal general peritonitis.)

“Mary Anne Sheridan admitted 27th April, 1794, delivered 27th April, was seized with paralysis attended with delirium about a fortnight since. Came into Hospital quite outrageous and after delivery sustained considerable Hæmorrhagy in consequence of her restlessness. Had taken no food for some days previous. Died comatose on the 29th”. (Insanity of Pregnancy.)

Many cases of severe complications of the third stage are detailed and a large proportion of such cases successfully treated by manual removal of



the placenta. Here is a note made on 13th August, 1794:—

"Placenta Retained an hour after expulsion of Fetus attended with considerable hæmorrhage, hand introduced to bring it away".

Triplets are reported with a maternal death due to "hæmorrhagy":—

"Children sent to work-house on the 23rd Sept., 1794. Two of them in particular promised to do well".

The Ward Book of 1800 shows much the same type of notes:—

"Annie McGahan admitted 20th August, 1800, delivered 22nd August, died 30th August of Peritonitis from delivery had constant dyarrhœa attended with incontinence of urine".

In 1811 the notes on the cases were much improved in detail:—

"Mary Lynch's labour commenced at Kilecock on the 13th July, 1811, and she was brought in here in a carriage on the 16th when it was evident from the symptoms that there was a rupture of the Uterus or Vagina and from her history it was supposed to have happened on the 14th. She was delivered with the Crotchet about 2 hours after her arrival with great difficulty the head being large proportionally to the Pelvis. She said she had been delivered at every previous pregnancy with instruments. She died in an hour after delivery. On dissection it appeared that the vagina had ruptured on the promontory of the sacrum and the uterus and every part in the abdomen were in a state of high inflammation. 1/1 for cleaning the cupola. N.B.—The distance from sacrum to pubis was not more than 3½ Inches".

Apparently the dissection was performed in the tower of the hospital.

"5/5 to be given to A. Richards to assist her in getting to her native Country the Isle of Man".

"J. Reilly was attacked by convulsions about 5 p.m. on 6th October, 1811. She was brought here at 8 p.m. in a state of stupor and the convulsions still continuing. She was bled at nine to the quantity of near forty ounces after which she got a natural sleep for twelve hours. On awakening she was quite sensible and remained easy all day. Towards night slight labour pains came on and towards morning they became very smart and after twelve hours severe labour without any recurrence of the Convulsions she was delivered at 5 p.m. of the eighth of a stillborn child, the head had been very much moulded".

A frequent entry is "Baby died of Trismus"—apparently tetanus due to cord infection.

#### THE 19TH CENTURY

The practice of obstetrics in the 18th and early 19th centuries was extremely undeveloped. The attitude of "laissez faire" was taken towards dystocia and only when urgent symptoms demanded delivery were steps taken, and the records of the Hospital taken from the Master's Ward Books during that period show that forceps deliveries were rare but that craniotomy, usually followed by death of the mother, was all too common. The treatment of ante-partum and post-partum hæmorrhage was, however, efficient, and occasionally eclampsics recovered, the main treatment being heroic phlebotomy.

In the Master's Ward Book for 1835, inscribed in perfect copperplate handwriting, is a summary of the abnormal cases occurring in that year. There were two outstanding men in the Hospital at that time, Evory Kennedy, the Master, and Murphy, his Assistant, who was afterwards

Professor of Midwifery in University College, London, and the author of "Lectures on the Principles and Practice of Midwifery". So far as I can judge the abstract was made by Kennedy himself. Kennedy's claim to fame is based on his communication with regard to the funic souffle and his long association with the Dublin Obstetric Association, which he founded in 1838. The summary shows that in 1835 there were 41 breech presentations, with one maternal death and 12 still-births, 5 of the babies lost being premature. There were 7 transverse presentations, 3 of the mothers were lost due to sepsis and 3 of the babies were still-born. In 8 cases the cord presented, 5 babies being lost and one mother dying of sepsis. Two cases of accidental hæmorrhage were treated and both recovered with living babies. Two cases of placenta prævia were treated and both recovered with living babies. Post-partum hæmorrhage occurred nine times before expulsion of the placenta and one mother died of sepsis. Thirty-six cases of post-partum hæmorrhage occurred after the expulsion of the placenta, one mother dying of hæmorrhage and one dying of sepsis. There were 22 cases of multiple pregnancy, all of which recovered. There were 2 cases of eclampsia, one of which recovered (delivered by forceps) and the other died (delivered by crotchet). There were 8 cases of forceps delivery, 3 of which died. Ten patients were delivered with crotchet, 5 of these died. In all there were 20 deaths from sepsis.

The next fifteen years showed two new methods of treatment in use in the Rotunda. The following extracts from the records are quoted:—

"Mary Victory, age 32. Admitted 30th Nov., 1844. Delivered 1st December. 26 hours in labour. Discharged 14th Dec. A pure case of arrest from Deficient Uterine Action, got two doses of Ergot".

"Hanna Wilson, age 27. Admitted 2nd Dec., 1844. Delivered 3rd Dec. 30 hours in labour. Disch. 11th Dec. Tedious from inert action of Uterus got Ergot and the vectis afterwards used. The child breathed several times. The perin. slightly torn".

These two histories are taken from Charles Johnson's Books.

*The use of chloroform.*—The following notes were made by Robert Shekleton who was an early advocate of the use of chloroform in midwifery and reported "The Use of Chloroform in 56 Cases in the Rotunda" as early as 1849.

"Mary Lennon, age 36. Admitted 19th March, 1850. Delivered 19th March. 9 hours in labour. Discharged 27th. Difficult Labour from straitness of sacrum pains being very strong and frequent. Os fully dilated head making no advance. Fearing rupture of uterus put under Chfm. and delivered with Forceps".

From 1854 to 1861 McClintock was Master of the Rotunda. McClintock edited, with annotations, "Smellie's Treatise on the Theory and Practice of Midwifery" (The New Sydenham Society, London, 1876) already quoted from. An excerpt from his annotations in regard to Mosse reads as follows:—

"Dr. Bartholomew Moss was in many respects a most remarkable man. His genuine philanthropy, farseeing wisdom, and extraordinary devotion to the great work which he initiated and completed, justly place him in the foremost rank of

medical philanthropists. Moss was the son of a clergyman, and was born in the Queen's County, in 1712. He obtained his surgical licence at Dublin in 1733. He opened a small maternity hospital, in a house hired for the purpose, in March, 1745, the expenses of which were defrayed chiefly out of his own pocket. Three years



FIG. 1.—Bartholomew Mosse, 1712-1759.  
Bust in the Hall of the Rotunda Hospital,  
Dublin.

afterwards he purchased the site of the present lying-in hospital, which was not completed till 1757, when it was opened and the patients were transferred from the temporary hospital in South George's Street. Moss died in 1759. His highest eulogy is contained in the sentence under his bust at the hospital: *Miseris solamen instituit*. Without fortune, without influence, without patronage, without precedent, he conceived the project of affording relief to a certain class of the community; and with extraordinary energy, prudence, and perseverance, by never relaxing, never despairing, he carried it into execution. A most interesting memoir of him, by Sir William R. Wilde, will be found in the second volume of the 'Dublin Quarterly Journal of Medical Science', p. 565".

Sir William Wilde, the father of Oscar Wilde, was himself a medical historian and his biography has recently been written by Dr. T. G. Wilson under the title of "Victorian Doctor".

Amongst McClintock's case notes are the following:—

"Teresa Martin, age 26. Delivered 29th Oct., 1860, at 10.15 p.m. 22½ hours in labour. Length of 2nd stage 9½ hours, length of 3rd stage 35 minutes. Sex of child, Male, born alive. Foetal heart audible on admission, cranial position 3rd 2. Discharged from Hospital, 7th Nov., 1860. *Vectis*. Head rested on perineum for 4 hours, got stimulating Enema and one dose of Ergot which acted well. The internal rotation was completed by the vectis. Laceration. Went without consent (Sent in by Dr. McMunn)".

"Anne Thompson, delivered 1st Dec., 1860, of a stillborn child. Enormous Hydrops Amnii. Child anasarcaous. Had one *Fit of Convulsions* at ¼ before 9 and another at ¼ 11 O'C. as Placenta coming away. Some oedema of extremities. Urine albuminous. Has very severe cough. Got one dose of Ergot, got hip bath in first stage with good effect".

George Johnston was Master of the Rotunda from 1868 to 1875. His term of office was notable for the fact that he published complete clinical reports which were read at the Dublin Obstetrical Society. These reports are models of their kind. Johnston's object in bringing the clinical material before the Dublin Obstetrical Society was to show that the well-run maternity hospital need not be a danger to the parturient woman. He opens his first report (for 1869) with the following observations:—

"As the question of the great prevalence of zymotic diseases and consequent

mortality in large hospitals, particularly lying-in hospitals, in comparison with the lesser mortality in extern maternity charities and small lying-in hospitals, has for some time back occupied the attention of the profession I think this a fitting opportunity, and I consider it is incumbent on me, filling the important post of Master of the Rotunda Lying-in Hospital, to come forward and lay before you the report of our institution for the past year. From the facts therein set forth, I think I will be able to show that accusations brought against us are incorrect.

"Previously, however, to doing so, I may be allowed to repeat a few remarks I made on a former occasion, when I asserted that 'it could not be admitted that zymotic disease (puerperal fever) prevails *endemically* in hospitals *generally*', although we have no hesitation in allowing that it may appear occasionally in those which may be ill-ventilated or overcrowded, and that it was injustice to put forward the dogma that where puerperal fever is epidemic it shows itself generally in our great maternity hospitals in the first instance. Such, I maintain, is not the case. On the contrary, how frequently have we known of it prevailing in other quarters, amongst patients confined in their own homes, and even among the affluent, when the hospital was perfectly exempt from sickness.

"Nay, how much rather should we look for these diseases in the localities from whence those seeking admission emanate—in the narrow, filthy, unswept street, the courts and alleys in too many instances reeking with the pestilential effluvia of half-putrid offal and ordure, which by imperfect sewage, or no sewage at all, allows the noxious gases escaping therefrom to pervade the over-crowded, small, unwashed, ill-ventilated apartments; their bedding, if possessed of such a luxury, saturated with filth and dirt; the unfortunate occupants frequently in a weak, emaciated state, from want, penury, starvation, and disease: in fact, everything tending to produce a poison which cannot be otherwise than injurious, and most likely to engender the malady we all have so much reason to fear. Contrast those miserable dwellings with the large, lofty, and airy wards of our institution, where perfect, thorough ventilation is observed; where the patients are not crowded together, but ample cubic space of air is allowed for each; where the strictest cleanliness in every manner is maintained, and every attention paid to their wants and well-being, by liberal diet, beef-tea, wine, etc.,—is it not reasonable to come to the conclusion that instead of the hospital being the habitat for zymotic disease, it should rather be attributed to the wretched abodes of those poor creatures who seek its shelter?

In order, therefore, to prove that what I have stated is correct, I beg leave to present to this Society an account of the deliveries, casualties, and results, as well as the particular circumstances under which they occurred, for the year ending 5th November, 1869, during which time 1,159 patients were delivered in the hospital.

Of these

937 were cases of purely natural labour

26 " " " tedious "

47 " " preternatural labour, viz., 7 upper extremity and 40 lower

81 were delivered with the forceps

4 " " by craniotomy

9 " " by version

1 the perineum had to be incised, owing to extreme rigidity

1 the os uteri had to be incised from undilatability

27 were complicated with twins

11 were cases of accidental hemorrhage

1 was a case of placenta previa

4 were cases of convulsions

10 " " prolapse of funis

1 was a case of induced labour at the eighth month

1 " " hydatids

Besides which we may include eight cases of mania occurring after labour, thus showing that we had the usual amount of difficulties and dangers to contend against that are liable to be met with in all large lying-in institutions".

In that year 25 patients died in the Hospital, 12 of them from zymotic

medical philanthropists. Moss was the son of a clergyman, and was born in the Queen's County, in 1712. He obtained his surgical licence at Dublin in 1733. He opened a small maternity hospital, in a house hired for the purpose, in March, 1745, the expenses of which were defrayed chiefly out of his own pocket. Three years



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"As the question of the great prevalence of zymotic diseases and consequent

hours in labour. Child alive. Mother died. Difficult 1st stage very protracted owing to rigid os for which she had a warm bath. When second stage was commenced it was accompanied by so much pain as to produce constant vomiting. Forceps applied by Dr. Henry—a good deal of difficulty was experienced in extracting the head. Hæmorrhage came on after birth of child for which the placenta was pressed off but was so profuse that *cold and hot water* failed to control it. Owing to it being of a bright arterial colour *perchloride of iron* was also injected which controlled it. But the patient was in a state of collapse for which hypodermics of *Ether* were used about every 10 minutes, after which patient rallied so far as to ask was the child born. Able to take a little Brandy and beef tea by mouth, having had previously an enema of Brandy and beef tea and Tr. Opii. Half an hour after, pulse gradually got weak again and notwithstanding every effort including transfusion (before which patient was pulseless) she died at 1.45 p.m., 2½ hours after delivery. Autopsy: Ruptured cervix opening one large blood vessel well closed by a clot. Kidneys appeared somewhat granular".

Extracts from the Master's Ward Book in 1882 show sepsis still rampant, and the hospital was closed for ten days. This outbreak of acute sepsis must have been one of the most terrible experiences ever encountered in a maternity hospital. From the opening of the hospital up to the time Smyly became Master (1889) the patients were delivered in the wards, and Smyly was determined that all the knowledge at his disposal should be used to wipe out puerperal sepsis which had proved such a scourge. He reorganized the hospital and instituted a labour ward and operating theatre and the results soon began to show. During the last year of his Mastership there was only one maternal death amongst the patients delivered in the hospital.

Two case histories in 1895:—

"Forceps—sent into hospital by Practitioner who had made ineffectual attempts to deliver 'with instruments'. Pains began 11 a.m. on 16th Feb. Delivery attempted 17th, 3 p.m. Admitted 17th, 10 p.m. Head midway in pelvis, os not fully dilated. 18th, 12.30 a.m. pulse irregular, about 140. Foetal heart 156. Forceps applied. Slight hæmorrhage which was controlled by Hot Douche. Child: Asphyxia Pallida. Schultz method success".

"Flattened Pelvis, 8½ cm. Labour induced by Krause's method combined with Glycerine plugs. External Cephalic Version by Master. Child born by Brow presentation. Female alive, 6 lbs. 0 oz. History: 1st, 2nd and 3rd, Forceps. 4th and 5th, Cross births, both dead. Lacerated Perineum, 3 catgut".

Sir William Smyly lived to a great age and saw seven Masters succeed him. His own Assistant, Tweedy, has paid tribute to his great powers.

#### THE 20TH CENTURY

The history of the present century in obstetrics is fresh in our minds. The continued effects of the principles adopted by Smyly brought maternal mortality down to a comparatively low figure but little or no improvement took place between 1910 and 1930. The work of Colebrook relating to the proper care necessary to prevent droplet infection and the use of modern antiseptics, such as dettol, promised to give good results. However, in 1937 the introduction of chemotherapy altered the whole problem of maternal mortality and last year the figure for Eire was 1.7 deaths per thousand live births compared with 4.5 ten years ago.

The adoption of the lower segment Cæsarean operation has been a striking advance, and Tweedy deserves credit for carrying out this operation

diseases. Johnston stuck to his guns and in spite of having good years and bad years with regard to the incidence of sepsis, his last Report in 1876 was alluded to by his colleagues in glowing terms. McClintock is recorded as having used the following words in speaking of Johnston's record Report in 1870: "He has proved that most of the deaths are not fairly attributable to hospital air or circumstances; that, in fact, the patients would have met their deaths anywhere else as certainly as in the wards of the Rotunda".

George Johnston has never received much credit from medical historians for his work. He came into the Rotunda when the hospital was at a very low ebb. Sepsis had become so serious that the necessity of closing the hospital completely had been contemplated. I have studied his Ward Book for 1870 and consider that his statement to the Dublin Obstetric Society was true:—

"Without wishing to make any boast I may state that for the purpose of securing a perfectly correct report I have taken the trouble of entering the particulars of every case myself, not from any book or other report, but from the lips of the patients themselves, so that the returns I have furnished are so far as lay in my power, accurate".

Johnston lived before the days when Cæsarean section had become an established operation in obstetrics. He made no attempt to introduce Cæsarean section as a method of treatment of disproportion but he did try to replace the atrocious operation of craniotomy on the living child by the use of forceps. He stated that 752 women were delivered with forceps during his Mastership and I have no doubt that Johnston did a great service to obstetrics generally in his approach to the problem of disproportion. I am certain that many of the infants he delivered with forceps must have been damaged, but taking into consideration the fact that he used the forceps when the head was high and when the os was not fully dilated, there seems to have been little damage inflicted on the mothers.

The following are two case histories from Johnston's records:—

"Julia Ward, aged 25. Admitted 5th Apr., 1870. Eclampsy 4 fits before admission. Admitted in comatose state, fits occurring every 20 minutes to half an hour. Os size of one shilling. Calomel grs. 10. Turpentine enema which was repeated in an hour. Cold effusion, sinapisms and chloroform. At 8½ p.m. head having entered the cavity os dilated to two shillings and relaxed, finding it capable of distention and fits recurring with frequency, delivered with long forceps having had 22 fits. Placenta expelled in 2 minutes. Given gr. 1 extract of belladonna by enema with beef tea repeated every 3 hours but without effect. The fits continued as before. Sinapism to nape of neck and cold kept to head. She sank 13 hours after delivery having had 53 fits".

"Maria Haden, 47 Upper Meeklenburgh Street, was delivered on the 3rd March, 1870. Married 10 months, since which never had a happy moment from the misconduct of a drunken husband. Three weeks before admission got a great fright from his attempt to throw himself out of the window, since which the child ceased to move. Came in with hectic flush on face, thin and emaciated. Was very slow in the first stage of labour, got warm bath and opiate, got beef tea. Child when born very putrid. Head greatly distended by fluid. Foetid discharge, ordered vagina to be syringed with solution Condy. Died of pyemia on the 13th".

A case history of 1881 illustrates some of the methods of practice:—

"Luey M, age 19. Admitted 25th October. Primigravida. Delivered 26th. 33

# BREECH PRESENTATIONS

By ALAN BREWS, M.D., M.S., M.R.C.P., F.R.C.S., F.R.C.O.G.

*Obstetric and Gynaecological Surgeon, London Hospital; Consulting Obstetrician to the Essex County Council.*

THOSE engaged in the practice of obstetrics are liable to encounter breech presentations both among booked cases and when responding to medical aid calls from midwives. The errors of judgment and faults in technique which may follow are usually attributable to a limited experience of the condition.

## ANTENATAL DIAGNOSIS AND TREATMENT

*The diagnosis* of breech presentation clinically is dependent upon the recognition by palpation of the distinctive features of the two poles of the foetus. It is rarely possible to do this before the 24th week of pregnancy. Breech presentation should be suspected when a hard, rounded, mobile mass occupies the upper part of the uterus and a less hard, irregular mass occupies the lower segment. This diagnosis can be confirmed or disproved with certainty by an X-ray examination but, apart from this, real help can often be obtained by making a bimanual examination with two fingers of the right hand in the vagina and the left hand on the lower abdomen.

It is often stated that the foetal heart can be heard with maximum intensity at a point above the level of the umbilicus and on the same side as that on which the back is palpable. This statement needs qualifying: it is only true when the pregnancy is near term and the full breech is above the pelvic brim. Earlier, when the frank or half breech is sunk deep into the pelvis, the foetal heart is often audible with maximum intensity below the umbilicus in a position similar to that characteristic of vertex presentations. A breech presentation, like any other malpresentation, should be regarded as secondary to some other abnormality until the presence of such an abnormality has been excluded by clinical examination. Every now and again the discovery of a previously unsuspected pelvic contraction, pelvic tumour or other abnormality rewards this method of approach. It must be remembered, however, that in the majority of cases the breech presentation will prove to be primary in that no other abnormality of any kind will be found associated with it. A breech presentation secondary to some other abnormality calls for institutional treatment by a specialist.

*The treatment* of a primary breech presentation, recognized before the 32nd week of pregnancy, should be to carry out an external cephalic version, if this can be done easily, but if there is any difficulty the breech presentation should be left alone as in more than half the cases spontaneous version will occur. Between the 32nd and the 34th week a more determined effort should be made to carry out external cephalic version. If this fails the patient should be referred for a second opinion, or a further attempt at version under anaesthesia should be considered. After the 34th week spontaneous version



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Domagk and Fleming are names that will shine through the coming centuries just as surely as the names of Pasteur and Lister do to-day.



FIG. 2.—The Rotunda Hospital, Dublin, viewed from the Nurses' Home.

Finally we may pay tribute to all those teachers who have contributed so much to the steady advance of obstetrics by their contributions embodied in great textbooks in English: Smellie, Ould, Collins, Ramsbotham, Playfair, Jellett, Williams, F. J. Browne, and Munro-Kerr.

#### References

- Browne, T. D. O'Donel (1947): "The Rotunda Hospital", Edinburgh.  
 Johnston, George (1869-1875): "Clinical Reports of Rotunda Lying-in Hospital".  
 Kirkpatrick, T. P. C., and Jellett, H. (1913): "The Book of the Rotunda Hospital", London.  
 Master's Ward Books: (1) Thomas Every (1793); (2) Francis Hopkins (1811); (3) Every Kennedy (1835); (4) Charles Johnson (1844); (5) Robert Shekleton (1850); (6) Alfred McClintock (1860); (7) George Johnston (1870); (8) Lombe Atthill (1881); (9) William J. Smyly (1895). (Unpublished.)  
 McBride, David (1750): "Miscellanea Medica". (Unpublished.)  
 McClintock (1877): "Smellie's Treatise on Theory and Practice of Midwifery", London.  
 McIntosh Marshall, C. (1939): "Cæsarean Section—Lower Segment Operation", London.  
 Murphy, E. W. (1862): "Lectures on the Principles and Practice of Midwifery", London.  
 Ramsbotham (1856): "The Principles and Practice of Obstetric Medicine and Surgery", London.  
 Tweedy, E. H. (1945): *Irish J. Med. Sci.*, 6th Series, 74.  
 Wilson, T. G. (1941): "Victorian Doctor: being the Life of Sir William Wilde", London.

# BREECH PRESENTATIONS

By ALAN BREWS, M.D., M.S., M.R.C.P., F.R.C.S., F.R.C.O.G.

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 Johnston, George (1869-1875): "Clinical Reports of Rotunda Lying-in Hospital".  
 Kirkpatrick, T. P. C., and Jellett, H. (1913): "The Book of the Rotunda Hospital", London.  
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The conduct of the *second stage* in breech labour should be governed by the general principle of interfering as little as possible and as late as possible. Prolongation of the second stage, so long as progress in proportion with the character of the labour pains is being made, is not harmful to the mother or the fœtus and serious complications may be created by premature interference. Nearly all the catastrophes in breech labours can be attributed to one of two causes: to the presence of disproportion due to an abnormally large fœtus or a contracted pelvis, or to premature attempts at delivery when the cervix, vagina and pelvic floor are incompletely dilated.

One *vaginal examination* should be made soon after the membranes rupture, to ensure that the cord is not prolapsing and to assess the state of the cervix and whether the full or the half breech is presenting. Subsequent progressive descent of the breech can be judged by rectal examinations.

As soon as the breech begins to peep the patient should be placed in the lithotomy position for delivery. This is easier to do when a modern obstetric labour bed is available but it can be managed quite well in a private house, assuming that three trained people are available—anæsthetist, obstetrician and midwife. In primigravidaæ always, and in multigravidaæ when the perineum is tight, a *postero-lateral perineotomy* should be carried out on the same side as that on which the legs are situated. A local anæsthetic is very satisfactory for this if the patient is receiving gas and air analgesia, but it can also be done under a light general anæsthetic. So long as progress is occurring, even if it is slow, no attempt should be made to bring down either one or both legs. In the case of the full breech, birth of the buttocks and feet together through the vulva should be allowed without aid other than that given by the perineotomy. In extended breech, the two buttocks, the lower lumbar spine and the extended femora should protrude so that the popliteal spaces are flush with the vulva before the legs are disengaged from the vagina. It is of paramount importance to realize that delay of the breech on the pelvic floor allows time for the greater dilatation of the whole of the lower genital tract and renders the birth of the shoulders and the after-coming head both easier and safer. Once assistance is begun it should be continued until delivery is complete. The buttocks should be wrapped in a warm covering. No traction should be made from below but the skilled use of fundal pressure to augment labour pains is often helpful. A loop of the cord should be pulled down and its pulsation kept under observation, and it should be ascertained whether or not the arms are extended. As soon as the body is born so that the inferior angle of a scapula is visible or palpable in the subpubic angle, the posterior arm should be brought down, either from the hollow of the sacrum if it is flexed or from a higher level if it is extended. The anterior arm should then be brought down to complete the birth with the exception of the after-coming head.

Two techniques are in use for effecting the *delivery of the head*.

In the more modern method advocated by Burns and Marshall of Liverpool the fœtus is allowed to hang by its own weight (care being taken that it does not fall completely from the vulva) until the head is no longer palpable in the lower abdomen, having descended into the pelvic cavity, and the occipital protuberance is visible or palpable in the subpubic angle. The fœtus, grasped by the two ankles, is then stretched sufficiently to render its body just taut and the legs are gently carried upwards in a large arc towards the mother's abdomen, the birth of the head through the vulva being controlled by the other hand. In the older method, that of Mauriceau-Smellie-Veit, the body of the fœtus is supported on the left forearm, and with the aid of pressure on the occiput with the middle finger of the right hand the head is kept flexed. Combined traction by locked fingers of both hands above the shoulders and controlled fundal pressure effect delivery. In general the Burns-Marshall method should be practised in the first instance but if there is a delay of

occurs with diminishing frequency (but it can occur even at term) and external cephalic version becomes progressively more difficult. External cephalic version is advocated because vertex labour is easier and safer for the mother and much safer for the fœtus. It should be remembered that breech labour is the most common individual cause of a third degree perineal tear into the rectum and that the still-birth rate and the neonatal morbidity rates are many times higher than the corresponding rates associated with vertex labours.

Complications may follow both successful and unsuccessful attempts at external version. These include onset of premature labour, antepartum hæmorrhage, the creation of a transverse lie instead of a breech or vertex presentation, prolapse of the cord, and death of the fœtus *in utero*. These formidable complications are very rare, particularly in the hands of an experienced obstetrician and their occasional occurrence does not outweigh the benefits resulting from the far more numerous successful versions. Complications are far more likely to occur when the patient is under an anæsthetic and greater application of force without consent on the part of the patient becomes possible. A certain number of failures to perform version must be expected, even by experienced practitioners, and these are most likely to occur when the patient is obese, the uterus is irritable or tense, or when there is little or no liquor amnii. In twin pregnancy, version is usually impossible unless one twin is lying directly in front of the other.

#### THE CONDUCT OF BREECH LABOUR

A great many breech presentations are to-day diagnosed antenatally and if version is impracticable arrangements can often be made to ensure delivery in the best available circumstances. Very often institutional delivery is preferable to domiciliary on account of the better amenities, but delivery by someone experienced in breech labour is of much greater importance. This is more especially true in the case of a primigravida. It must be remembered, however, that many breech labours are straightforward.

Whenever possible a breech labour should be preceded by careful *clinical pelvimetry*, both external and internal, and when the amenity is available, by *X-ray pelvimetry*. Of the clinical measurements the diagonal conjugate and the transverse distance between the tuber ischii are the two most important. An attempt should be made to decide whether the fœtus is large, average or small in size, and a straight X-ray of the fœtus should be obtained shortly before term so that its attitude at the onset of labour is known.

The conduct of the *first stage* of breech labour differs little from that of the first stage of a vertex labour. It is customary to keep the patient in bed with a view to conserving the membranes for as long as possible, but it is doubtful if this immobilization makes any material difference. There is practically never any reason to bring down a leg, whether it be flexed or extended, during the first stage of labour, and this should certainly never be done without first obtaining a reliable second opinion.

The conduct of the *second stage* in breech labour should be governed by the general principle of interfering as little as possible and as late as possible. Prolongation of the second stage, so long as progress in proportion with the character of the labour pains is being made, is not harmful to the mother or the fœtus and serious complications may be created by premature interference. Nearly all the catastrophes in breech labours can be attributed to one of two causes: to the presence of disproportion due to an abnormally large fœtus or a contracted pelvis, or to premature attempts at delivery when the cervix, vagina and pelvic floor are incompletely dilated.

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more than two minutes, if the fœtus is making respiratory efforts or if the cord pulsation is unsatisfactory, then the second method should be adopted.

It is always desirable to have a pair of long, curved obstetric forceps boiled ready for use during breech labours. The application of forceps to the after-coming head, the body being held up by an assistant, is much safer than making undue traction on the shoulders and thereby risking serious damage to the cervical spine.

The conduct of *the third stage* of labour is similar in breech and vertex deliveries. The perineotomy should not be completely closed by suture until the placenta and membranes have been delivered.

#### CÆSAREAN SECTION AS AN ALTERNATIVE TO BREECH LABOUR

Cæsarean section has a definite though limited place in avoiding risks entailed in breech labour if it is considered that these are exceptionally great. The primary consideration should be of the relative risks of breech labour and Cæsarean section to the mother. Only if these risks are adjudged to be approximately equal can the advantage of Cæsarean section in reducing the fœtal risk be allowed to influence the final decision. Cæsarean section, in a fit woman before labour has begun or in the early stages of labour before the membranes have ruptured, has a very low risk in ideal conditions. In proportion as these ideal conditions are missing, the operation increases in risk. On the other hand, a normal breech labour is even safer and much more desirable for the mother and again, in similar ideal conditions, carries very little risk to the fœtus in excess of that inherent in vertex labours.

*Disproportion* is the primary indication for Cæsarean section and it is warranted by much lesser degrees of disproportion than would be accepted as indicating it in cases of vertex presentation. There, slow moulding in a trial labour may overcome the disproportion but this cannot occur in the delivery of the after-coming head. Assessment of disproportion is not as easy or as accurate in breech presentations as in vertex presentations but good judgment can be developed with experience.

The final decision for or against Cæsarean section will depend upon clinical and radiological assessment of the size of fœtus and pelvis and on the amount of influence certain secondary factors are allowed to exert. These secondary factors include the age of the patient, the importance of the child to the parents, the rigidity of soft tissues, the fortitude of the patient, and the available amenities. Labour can, of course, be allowed to start and, if it develops unsatisfactorily, can be abandoned in favour of Cæsarean section if risk of conveying infection is still minimal.

In conclusion, it should be remembered that breech labour, in the absence of disproportion, can almost always be brought to a completely satisfactory conclusion for both mother and child if it is conducted in a reasonable environment by experienced personnel. Radical interference should be deferred until an experienced second opinion has been obtained.

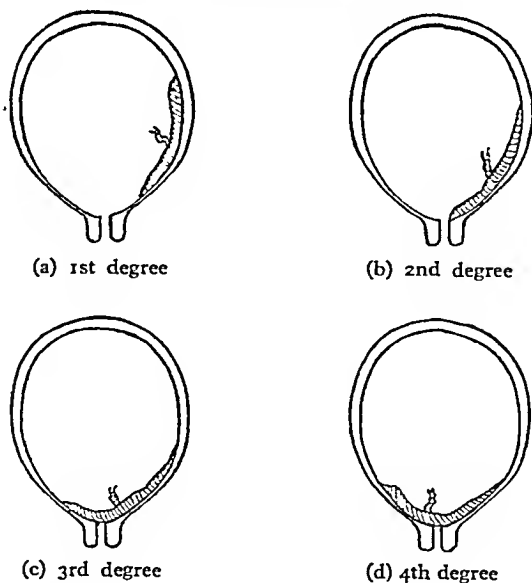
# PLACENTA PRÆVIA

By T. N. A. JEFFCOATE, M.D., F.R.C.S.Ed., F.R.C.O.G.

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THE dramatic and sometimes tragic possibilities of placenta prævia are so well known that few practitioners can approach a case without anxiety, if not alarm. One of the disconcerting features of the condition is that it often manifests its presence when the pregnancy has appeared to be progressing normally. Although the patient is multiparous in eighty per cent. of cases, its incidence in each parity group is very similar, i.e. each pregnancy, no matter whether it be the first, second, third or fourth, carries approximately the same risk (Berkeley, 1936). Placenta prævia appears to be a chance development and there are no known foetal or maternal causal factors, other than multiple pregnancy. In the past there has been considerable difference of opinion as to the best method of treatment, but there is now a wide measure of agreement both as to the initial and the subsequent management of this type of ante-partum hæmorrhage. To have a clear-cut plan of action for dealing with it does much to remove the attendant's natural anxiety, and also offers both mother and child the best chance of survival. This plan should be based upon an appreciation not only of the anatomy, but of the effects and complications of placenta prævia, and on the inherent dangers of some methods of treatment.

FIG. 1.—Degrees of placenta prævia.





## TYPES OR DEGREES OF PLACENTA PRÆVIA

The traditional classification of placenta prævia into central, marginal and lateral types was never satisfactory if only because of confusion over their definition, and it has now been to a large extent superseded by the classification described by Browne (1944).

*First degree.*—The placenta is partly in the upper and partly in the lower segment, but does not extend down to the internal os (fig. 1a).

*Second degree.*—The edge of the placenta reaches the internal os but at no time overlaps it (fig. 1b).

*Third degree.*—The placenta mainly occupies the lower segment but is placed eccentrically so that it covers the internal os when the latter is closed, but not when it is dilated (fig. 1c).

*Fourth degree.*—This is the true central type in which the placenta is distributed so evenly over the lower segment and cervix that the latter remains covered even when it is fully dilated (fig. 1d).

In any of the first three degrees the placenta may be situated mainly on the anterior, posterior, or lateral aspects of the lower segment, and its position, as well as its degree, is important from the standpoint of both diagnosis and treatment.

## THE RISKS OF PLACENTA PRÆVIA AND ITS COMPLICATIONS

The obvious danger to the mother is hæmorrhage from the placental site when the "taking up" and dilatation of the lower segment cause partial separation of the placenta. This, however, is not the only risk. The proximity of the placenta makes the cervical tissues exceptionally vascular and friable, so that manipulations, or attempts to hasten delivery by strong traction on the fœtus during the first stage of labour, are likely to cause lacerations which may extend deeply and bleed profusely. The third stage of labour may be complicated by delay and difficulty in placental separation, partly because the muscle of the lower segment does not contract and retract strongly, and partly because some areas of the placenta tend to be morbidly adherent. A woman already anæmic from previous hæmorrhage is ill-fitted to withstand even a moderate amount of post-partum bleeding from an atonic placental site or from a cervical tear, and so it has often been said with much truth that in placenta prævia the patient dies from post-partum, rather than ante-partum, hæmorrhage. Intra-partum and puerperal infections are common if there is manual or instrumental interference during labour because the raw placental site is close to the portal of entry of organisms, and the patient's resistance is lowered by hæmorrhage.

The fœtus is in even greater danger than the mother. It may die from intranatal asphyxia because of placental separation, especially if the cord happens to be inserted over the area of separation (Macafee, 1945, 1946), or because of the compression of the placenta which is a feature of many

methods of treatment. Birth injury attributable to procedures such as version and breech delivery is another possibility. The likelihood of foetal malformation is also slightly increased. However, the most important predisposing factor in the majority of still-births and neonatal deaths is prematurity. Unless this can be avoided a high foetal mortality rate is inevitable.

#### CLINICAL FEATURES AND DIAGNOSIS

The only symptom is uterine hæmorrhage, which is typically recurrent. The amount is variable and on the first few occasions it may be little more than "a show". Sooner or later there may be a heavy and alarming loss. As a rule the bleeding comes on suddenly and without provocation, sometimes during sleep. It is characteristically "painless", unless the patient happens to be in labour. The first hæmorrhage most often occurs between the 32nd week of pregnancy and term, but in about 5 per cent. of cases there is no bleeding until the woman is already in labour. Although the accepted definition of ante-partum hæmorrhage appears to exclude the possibility, placenta prævia not infrequently causes bleeding before the child is viable. It is probably the cause of many cases of abortion, although its diagnosis in the early months of pregnancy is usually impossible. Even fatal cases of "unavoidable hæmorrhage" between the 20th and 28th weeks of pregnancy are not uncommon. Patients found to be suffering from placenta prævia in the later weeks sometimes give a history of threatened abortion in early pregnancy. It is not unreasonable to assume that the later the onset of bleeding the less the degree of placenta prævia, but if this is true as a generalization, there are many exceptions. Labour is sometimes well advanced before a fourth degree placenta prævia produces symptoms.

The *physical signs* of placenta prævia depend upon the fact that the mass in the lower segment tends to displace the presenting part and prevent its engagement. Malpositions such as breech presentation and transverse lie are common, and if corrected, tend to recur. When the foetal head is presenting it remains unusually high above the pelvic brim, and if the placenta lies mainly to one or other side of the lower segment, the head is pushed to the opposite side of the middle line (fig. 2: see plate facing p. 32). A placenta situated posteriorly or anteriorly is less easy to recognize, but in the former the foetal head is pushed forwards and appears to override the symphysis, whereas in the latter it lies far back and is difficult to palpate accurately because of the intervening placental tissue. Although a high presenting part is nearly always a characteristic feature in cases of third and fourth degrees of placenta prævia, there are exceptions. Occasionally a central placenta prævia is very thin and "membranous" and it may then not interfere with engagement of the head.

*Diagnosis.*—The only clinical method of diagnosing placenta prævia with certainty is to feel the placenta with a finger inserted through the cervix. This may necessitate general anæsthesia and the insertion of the whole hand into the vagina. If only an ordinary bimanual examination is performed and

the cervix is closed a suggestive but not conclusive sign is the feeling through one or other vaginal fornix of what has been described, with more imagination than accuracy, as a "boggy mass". The sensation is more a negative one of "something" intervening between the fetal head and the examining fingers. This sign is only applicable when the presentation is cephalic. However, any intrapelvic examination other than the careful insertion of a vaginal speculum to inspect the cervix involves a serious risk of causing further bleeding and should be avoided, except in the special circumstances described later. The diagnosis of placenta prævia can be made with a high degree of accuracy on the history of the case taken in conjunction with the findings on abdominal examination. Indeed, it should be suspected even before hæmorrhage occurs if, during routine antenatal examination, the presenting part is high for no apparent cause. Not infrequently placenta prævia is discovered accidentally during Cæsarean section, or during attempts to induce labour by inserting bougies or by rupturing the membranes.

Many have tried to devise special tests to confirm the position of the placenta in the uterus, and in particular to visualize it by X-rays. In spite of some claims to the contrary, the placenta can rarely be seen on ordinary "straight" skiagrams. It shows as a filling defect, however, when radio-opaque solutions, such as "urosclectan", are injected into the amniotic cavity, but amniography, as this procedure is called, is not often practised because it invariably induces labour and is in any case dangerous to the fœtus. Cystography, however, has a place in the diagnosis of placenta prævia. The bladder is filled with a radio-opaque fluid, such as 12½ per cent. sodium iodide, and lateral, oblique, and antero-posterior skiagrams are then taken to determine the width and shape of the space between the presenting part and the fundus of the bladder. Normally this is narrow and of even width; less than 1.5 cm. (fig. 3). In the case of placenta prævia the space is wider and may be wedge-shaped, the base of the wedge indicating the position of the placenta (fig. 4 and 5: see plate facing p. 33). Cystograms, however, are only useful from the 36th week of pregnancy onwards, and when the fetal head is presenting. Even then they do not reveal a placenta which is situated mainly on the posterior wall of the lower segment.

#### MANAGEMENT AND TREATMENT

*Emergency treatment at home.*—Every case of ante-partum hæmorrhage, no matter how slight, and irrespective of its cause, requires admission to hospital or a fully-equipped nursing home. The initial treatment in the patient's own home is the same no matter whether the hæmorrhage be "accidental" or "unavoidable". It should be regarded as "first-aid" only and, so far as placenta prævia is concerned, is based on the fact that the first hæmorrhage is rarely fatal provided there is no interference by the attendant. On arrival, the practitioner will in nearly all cases find that the

bleeding is abating or has ceased. A presumptive diagnosis may be made on the history and the findings on general and abdominal examination, but no attempt should be made to confirm it. Vaginal and rectal examinations should be avoided at all costs, and if they are, and provided the patient is kept quiet in bed, cessation of the hæmorrhage can confidently be expected unless the patient is already in labour, when the bleeding may continue in small gushes with each contraction of the uterus. If necessary, morphine may be given, an abdominal binder applied tightly over the fundus of the uterus, and the foot of the bed raised. Packing of the vagina and other heroic measures are rarely, if ever, indicated and are dangerous. As soon as her condition permits the patient should be moved to hospital by ambulance. A heavy loss calls for blood transfusion *before* transfer.

*Management in hospital or nursing home.*—On admission, and provided the patient is not in labour, treatment is on similar lines. The blood group (including Rh factor) and hæmoglobin level are determined. Careful examination of the abdomen is made for signs of placenta prævia, to see whether the fœtus is alive, and to assess its size. Toxæmia of pregnancy and cardio-renal disease (often associated with accidental ante-partum hæmorrhage) are excluded by routine tests. Unless the pregnancy is approaching term or labour has started, every effort is then made to postpone active intervention until the fœtus is sufficiently developed to have the best chance of survival. A speculum examination may be made to exclude a local lesion in the cervix but vaginal digital examination is still deferred even though the diagnosis remains in doubt. An expectant attitude is quite safe provided the patient is in hospital under expert supervision and provided the recurrence of bleeding is reported immediately. With the help of blood transfusion, however, patients can often be tided over several bleeding episodes. During the waiting period the patient need not be confined strictly to bed; cystography can be carried out and the fœtus X-rayed for evidence of maldevelopment. Any anæmia should be corrected, and in deciding whether blood transfusion is necessary it should be kept in mind that further hæmorrhage before, during, or after delivery, is almost inevitable.

The timing of the institution of more active measures sometimes calls for considerable judgment but is usually determined by the onset of labour or the occurrence of hæmorrhage after the fœtus has attained a reasonable size. The patient should then be taken to the theatre with all preparations made for any procedure, including Cæsarean section. Under these conditions vaginal examination is made to clinch the diagnosis and determine the exact state of affairs. The choice of treatment depends mainly upon the degree of dilatation of the cervix at the time at which hæmorrhage occurs, and also on the location of the placenta in the lower segment. Other factors to be taken into consideration are the age and parity of the mother and sometimes the viability of the fœtus. However, the condition of the fœtus should not be allowed to weigh too heavily, and even when the fœtus is dead or is too small to survive, Cæsarean section may still be best for the mother.

## METHODS OF TREATMENT

The different methods of treating placenta prævia have been subjected to critical review in recent years and as a result many have come into disfavour. Indeed, so far as the safety of both mother and child is concerned, "it would appear that there remain really only two methods of treatment for placenta prævia . . . The alternatives are rupture of the membranes for the slighter cases of lateral placenta prævia, and Cæsarean section for all others" (Munro Kerr, 1946). This is true with a few exceptions; for instance, sometimes in first and second degree placenta prævia, the bleeding is slight and there is no need to interfere with the natural course of labour; or again, the hæmorrhage may not occur until the cervix is fully dilated, when all that is necessary is immediate delivery with forceps.

(a) *Artificial rupture of the forewaters.*—This gives satisfactory results in first degree cases and also in second degree cases provided labour is in progress, the uterus contracting well and the cervix already partly dilated. It is least efficient when the placenta is on the posterior aspect of the lower segment, for the fœtal head cannot then sink down and compress the separated part of the placenta. In such cases Cæsarean section is preferable.

(b) *Cæsarean section.*—This is the treatment of choice in all cases of third and fourth degree placenta prævia, and is usually the best for second degree cases when the patient is not in labour or when the cervix is less than two fingers dilated. Leaving aside the possibility of coincidental factors such as pelvic contraction, and considerations of age and parity, it is indicated as a rule in all cases in which, at the time of the hæmorrhage demanding active treatment, the patient is not in labour with the cervix appreciably dilated and uncovered by the placenta.

With few exceptions the lower segment operation is desirable in view of the danger of infection and because, as always, it carries a lower risk than the classical operation. Moreover, it does not preclude natural delivery in future pregnancies. It may mean making an incision directly over the placenta and through an area of uterine wall where the veins are enormously dilated, but this is more alarming to the surgeon than dangerous to the patient. The initial incision with a scalpel should be small and is then stretched with the fingers as described by Marshall (1939). The real bogey is post-partum hæmorrhage from the atonic placental site, and this is just as likely, if not more likely, in the upper segment operation. The risk of hæmorrhage both from the incision and from the placental site is largely dependent upon the type of anæsthesia employed. General anæsthesia with gas-oxygen-ether or cyclopropane must be light if it is to be safe. Local analgesia, supplemented, if need be, with a small dose of sodium pentothal intravenously during the delivery of the child and closure of the incisions, is the ideal, although spinal block is also satisfactory provided the patient is not exsanguinated and the operator is fully aware of its special dangers for the pregnant woman and how to avoid them.

(c) *Other methods of treatment.*—Other methods of treatment require only brief mention. Packing of the vagina is both inefficient and dangerous. Bipolar version involves a risk of causing further and dangerous hæmorrhage, although once completed the plugging with the half breech controls the bleeding well, at any rate in the lesser degrees of placenta prævia. The fetal mortality rate, however, is 80 or 90 per cent. It is rarely indicated except when the fetus is already dead or is malformed, and the cervix is uncovered by placenta. Scalp traction by Willett's forceps carries a lower fetal risk, but its usefulness is limited to the less serious cases when artificial rupture of the membranes and the application of the binder have failed to control the bleeding completely.

(d) *Management of the third stage of labour.*—The risk of third stage and post-partum hæmorrhage has already been emphasized, and should be kept in mind during either vaginal or abdominal delivery. The slightest difficulty in separation and delivery of the placenta or the onset of any bleeding should be met by immediate manual removal of the placenta together with the *intravenous* injection of 0.5 mgm. ergometrine.

#### CONCLUSION

The changing outlook in the treatment of placenta prævia, together with the availability of adequate supplies of blood for transfusion and the advances in chemotherapy have resulted in a considerable improvement in the maternal and fetal mortality rates. Until about ten years ago, in this country, 5 to 7 per cent. of mothers and at least 50 per cent. of babies were lost. Similar figures are still sometimes recorded, and in some quarters progress has been delayed by a prejudice against the use of Cæsarean section. The above statistics should be compared with those recently published by Macafee, who collected the results of four large series of cases in which there were only two deaths among 616 patients (0.32 per cent.). In his own series Macafee (1945, 1946) was able to reduce the fetal mortality rate to 22 per cent. (corrected to 18 per cent.) without increasing the maternal risk. The simplification of treatment and the improvement in results, however, should not be allowed to induce a false sense of security or an attitude of complacency so far as the medical attendant is concerned. Placenta prævia is always potentially, if not actually, dangerous to both mother and child, and fatalities are only averted by the most watchful and expert care.

#### References

- Berkeley, Comyns (1936): *J. Obst. Gynec.*, 43, 393.  
Browne, F. J. (1944): "Antenatal and Postnatal Care," London.  
Kerr, J. Munro (1946): *Proc. roy. Soc. Med.*, 39, 556.  
Macafee, C. H. G. (1945): *J. Obst. Gynec.*, 52, 313.  
— (1946): *Proc. roy. Soc. Med.*, 39, 551.  
Marshall, C. M. (1939): "Lower Segment Cæsarean Section," Bristol.

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It is in the antenatal period and during the course of labour that radiology plays its important rôle. In some few cases radiological diagnosis is helpful in the postnatal period, such as foetal abnormalities not diagnosed during pregnancy, birth injuries and abnormalities of the cardiovascular and respiratory systems of the newborn.

With the increasing use of mass radiography of the chest, practitioners have become "chest-conscious", and it is now regarded of primary importance that expectant mothers should have their chests X-rayed in the early stages of pregnancy.

The main indications for radiological examinations in obstetrics are:—

- (1) The demonstration of the normal and abnormal foetus.
- (2) The demonstration of the maternal pelvis.
- (3) The demonstration of the foetal and maternal soft tissue structures.
- (4) The investigation of the maternal urinary tract in pregnancy and the postnatal period.

## THE NORMAL FŒTUS

The differential diagnosis of *early pregnancy* from a pelvic tumour such as a cyst, fibroid or hydatidiform mole, is sometimes difficult, but abnormal calcification typical of a fibroid, or dental structures in a dermoid (fig. 1: see plate facing p. 50) may be discovered radiologically and facilitate the diagnosis. X-ray examination is advisable in very obese women prone to long periods of amenorrhœa and in pseudocyesis. Radiology can be of definite help in the diagnosis of pregnancy only after the 16th to the 18th week, although foetal structures have been visualized on skiagrams as early as the 14th week of gestation. Several radiographic positions may be required to demonstrate one or more of the shadows cast by the foetus, such as the dotted shadow of the spine, the ladder-like shadows of the ribs, the crescentic shadow of the foetal head (fig. 2) or the linear shadows of the foetal limbs. Methods using contrast media to show an early gestation are only of academic interest but not of any practical value. They may in fact lead to early abortion. Pneumoperitoneum to show the enlarged uterus, or hysterosalpingography to show a filling defect in the uterine cavity are therefore only permissible in cases in which abortion is contemplated.

Radiological examination is useful for determining *the presentation and position of the foetus*, particularly in women with tense or obese abdominal walls. It should be realized, however, that the foetus may completely change its position between the time of examination and the onset of labour.

The patient should always be examined in two planes, i.e., a supine or prone and a lateral view are taken. In vertex presentations the posterior or anterior position of the occiput can be shown and also the degree of flexion or extension. In breech cases it is possible to see whether the legs are extended or not, and the position of the hands in relation to the fetal head. Similarly, any of the rare presentations, such as shoulder, transverse lie, brow or face presentations, are clearly demonstrable (fig. 3 and 4).

The differential diagnosis between *multiple pregnancies*, large fetus, and hydramnios is often very difficult clinically and X-ray examination may explain a discrepancy between the size of the uterus and the estimated duration of pregnancy. It should be remembered that one of the fetuses may die early and the dead fetus thus be missed; again, one of the fetuses may move during the exposure and its outline become so blurred as to be unrecognizable. Repeated X-ray examinations may therefore be necessary (fig. 5 and 6).

The *radiological estimation of fetal maturity* is often asked for, if the clinical history is unreliable. The not infrequent need for termination of pregnancy in the interest of the child makes this problem a very practical one. Some rough idea may be deducted from the general size of the fetus on routine skiagrams, if the position of the patient and the tube-film distance are known. The appearance of the ossific centres of the fetal bones is, however, a more reliable method for estimation of the fetal maturity. The average date of appearance of these centres is as follows:—The cuboid, if present, indicates that the fetus has reached at least the 36th week. The lower epiphysis of the femur, on the appearance of which much reliance is usually placed, may appear at any date between the 35th to the 40th week and some authors claim to have observed it in the 24th week of gestation.

The best index of fetal age is the fetal length, but this measurement is obviously impossible to obtain *in utero*. Hence intra-uterine measurement of the fetal head diameters are largely depended upon for the estimation of fetal age (cephalometry). Various authors have described methods for the determination of the fetal skull diameters, the occipito-frontal diameter being widely used. Some authors consider an occipito-frontal diameter of 11.5 cm. or more as sufficient for fetal maturity and consider an occipito-frontal diameter of less than 10.5 cm. as an indication of prematurity. Tables have been computed to correlate the occipito-frontal (or bi-parietal) diameters to the minimum and average body weight. The value of these estimations, however, is not very great, and they should be used only as an additional help to investigation, when the result of clinical methods is doubtful (fig. 7).

#### EXTRA-UTERINE PREGNANCY

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#### EXTRA-UTERINE PREGNANCY

The diagnosis of an ectopic pregnancy by radiological investigation is usually possible only after the 5th month of gestation. When the foetus occupies an asymmetrical or high position in the pelvis, the existence of an

extra-uterine pregnancy may be suspected, although a pelvic tumour with pregnancy may cause a similar uterine displacement. Cases have been described in which an ectopic gestation occupied the middle of the pelvis, and had deviated the uterus to one side. An ectopic pregnancy may be suspected radiologically by an unusual clarity of the foetal skeleton, due to absence of the soft tissue shadow of the uterine wall, and by well-marked overlapping of the foetal parts by intestinal gas shadows.

Radiography after the introduction of lipiodol into the uterine cavity may reveal a normally shaped or elongated uterus in ectopic pregnancy. This method, however, is justifiable only when there is strong clinical or radiological suspicion of extra-uterine pregnancy and when termination of the pregnancy is desirable.

#### FŒTAL DEATH

A definite clinical diagnosis of foetal death is rarely made without radiological evidence, especially in cases of hydramnios or when a tense or obese abdominal wall makes foetal heart sounds and movements difficult to elicit. The most reliable sign of foetal death is an overriding of the foetal skull bones (Spalding's sign), the overlap at the sutures taking place from shrinkage of the brain. This sign must be regarded with caution in cases near full term, as the moulding of the head in labour may cause a similar radiographic appearance (fig. 8). Spalding's sign may be found within four to seven days of intra-uterine death, but it is desirable to repeat the X-ray examination after the interval of a week, if the sign is not present at first. The presence of hydramnios is said to prevent the development of Spalding's sign. Other less reliable signs of intra-uterine death are:—

(1) The rolled-up attitude of the foetus. This appearance is of special importance in non-vertex presentations, for in this presentation Spalding's sign may be absent.

(2) Lordosis of the lumbo-sacral spine and falling-in of the thoracic cage, with a kyphotic deformity of the dorso-lumbar spine. For the demonstration of these deformities skiagrams may have to be taken in a lateral view.

(3) Defective calcification of the foetal skeleton. This may be caused by faulty metabolism of the mother, and be simulated by over-exposure of the X-ray film.

(4) Smaller foetal size than would be expected from the period of gestation.

(5) Absence of increase in the size of the foetus measured at frequent intervals.

(6) Recently gas in the foetal circulation has been described by Boyd Roberts (1944) as a sign of intra-uterine foetal death.

#### THE ABNORMAL FŒTUS

In the antenatal demonstration of foetal abnormalities radiology plays a rôle of the greatest importance, for precise knowledge of their presence and

presentation may influence the obstetrician in his conduct of the pregnancy and labour. In all cases of hydramnios of doubtful etiology an X-ray examination should be carried out, as unsuspected fetal abnormalities may thereby be revealed. X-ray examination is especially indicated before resorting to a Cæsarean section. Fetal abnormalities are legion but those most commonly encountered are:—

*Anencephaly*.—This is occasionally mistaken clinically for a breech presentation. There are characteristic radiological appearances. The absence of the cranial vault is easily demonstrable. Another feature of the abnormality is the presence of broad shoulders and a well-developed, sometimes post-mature, skeleton. The anencephaly may be associated with other skeletal deformities of the fetus. Fig. 9a and b show the specimen after delivery of a case of twin pregnancy with one large anencephalic fetus, and another small fetus (fetus papyraceus).

*Inencephaly*.—This condition is characterized by imperfect formation of the occiput in the region of the foramen magnum, a spina bifida and an angular spinal deformity with marked retroflexion in the cervical region. Retroflexion or hyperextension of the fetal head is present in other conditions, such as a fetal thyroid tumour, or in simple overextension of the head in brow or face presentations.

*Hydrocephalus*.—This is easily demonstrated radiologically if the size of the fetal skull and its relation to the fetal spine and maternal pelvis can be established. The skull is large, the skull bones relatively thin, separation of the fontanelles may be demonstrated, and there is sometimes a characteristic forward bulging of the brow. An associated spina bifida or meningocele may be shown by an angular deformity of the spine, usually in the lumbar region. The diagnosis of hydrocephalus must be established with care and skiagrams should be taken in two or three different positions, as distortion and apparent enlargement of the fetal head may be seen when the fetal head is comparatively distant from the film and some magnification occurs.

A *meningocele* cannot always be diagnosed in an X-ray film, as the soft tissue opacity caused by the sac cannot be differentiated from the amniotic fluid. Its presence should, however, be suspected when an angular deformity of the spine suggests a spina bifida.

Other rare congenital abnormalities of the fetal skeletal system, which can be diagnosed antenatally, are:—Osteogenesis imperfecta, achondroplasia, Albers-Schönberg's disease (marble bones), cranio-cleido-dysostosis, and lacunar skull.

*Hydrops fetalis (erythroblastosis fetalis neonatorum)*.—Recent work has drawn attention to this condition. The disease results in most cases from isoimmunization of an Rh-negative pregnant woman by Rh-positive fetal erythrocytes. The maternal anti-Rh agglutinins later cross the placenta into the fetal circulation and hæmolyse the vulnerable fetal red blood cells. The hæmolysis of fetal cells before birth is responsible for jaundice, anæmia, œdema, splenomegaly, and hepatomegaly. In some cases (the

hydrops form) there are no skeletal changes, but Javert (1942) has drawn attention to three X-ray signs:—

(a) The œdema of the scalp causes a "halo shadow" about the fetal skull.

(b) The placental shadow is unusually large.

(c) The fœtus assumes the "Buddha position", as the four limbs are splayed away from one another and from the body by the enlarged abdomen.

In cases of erythroblastosis fœtalis in which prenatal endochondral bone formation is interfered with, transverse bands of increased and diminished density develop in the ends of the shafts. Caffey (1945), and Follis and his colleagues (1942), found diffuse sclerosis of the shaft in five cases.

### THE MATERNAL PELVIS

It is a well-established fact that the type of pelvis exerts an appreciable effect on the mechanism of labour, and in recent years extensive studies on this subject have been made in America (Caldwell and Moloy, 1933) and this country (Chassar Moir, 1946; Rohan Williams, 1946). Some enthusiastic workers have advocated routine examinations for pelvimetry in all primiparas, but this is a time-consuming and costly procedure and it would be reasonable to restrict X-ray examination to those primiparous cases in which clinical examination suggests some significant anatomical variations and to multiparas in whom there is the history of a previous difficult labour. Rohan Williams (1946) also advocates radiological examination during labour, as at that stage fetal-pelvic relationship can be studied to the best advantage. Caldwell and his colleagues give the following morphological classification:—

(1) *Anthropoid pelvis*.—(long narrow oval pelvis) also called "transversely contracted" or "assimilation" pelvis.

(2) *Gynecoid pelvis*.—(round pelvis).

(3) *Flat or platypelloid pelvis*, with a short antero-posterior and a long transverse diameter (fig. 10).

(4) *Android pelvis* (wedge-shaped pelvis), the widest transverse diameter being at the promontory.

As a rule the human female pelvis does not conform to a pure "parent" type but falls into a mixed or borderline group.

Gross pelvic abnormalities can usually be shown in routine skiagrams. Stereoscopy may give further help. Roberts (1938) gives the following classification of these abnormalities:—

#### (A) *Congenital abnormalities*

(a) Generally contracted pelvis

(b) Simple flat pelvis

(c) Assimilation pelvis

(d) Roberts's pelvis

(e) Generally enlarged pelvis

(f) Split pelvis

#### (B) *Acquired abnormalities*

(1) Disease or injury of the pelvic bones

(a) Rickets.—(i) Rachitic flat pelvis

(ii) Rachitic flat and generally contracted pelvis

(iii) Irregularly contracted rachitic pelvis

- (b) Osteomalacia
- (c) New growths
- (d) Fracture
- (e) Atrophy, caries, necrosis
- (2) Disease or injury of the pelvic joints
  - (a) Synostosis of the pelvic symphysis
  - (b) Synostosis of one or both sacro-iliac joints
  - (c) Synostosis of sacro-coccygeal joint
  - (d) Exaggerated movement or separation of pelvic joints
- (3) Disease or injury of the hip joints or lower limbs
  - (a) Coxitis
  - (b) Luxation of the head of one or both femora
  - (c) Absence or deformity of one or both lower extremities
- (4) Spondylolisthesis: progressive slipping of the vertebral body with the anterior portion of the neural arch over the superior surface of the sacrum (fig. 11).

*Pelvimetry* may be necessary to determine minor pelvic deformities, and for the measurements of pelvic diameters at the inlet and outlet. In recent years attention has been drawn to the fact that difficult labour is often the result of an unsuspected contraction of the pelvis at the outlet. X-ray pelvimetry has been carried out at University College Hospital on some 1,800 cases during the past five years. The different methods described all aim at determining a correction factor for the distortion caused by the distance of the plane of the pelvis to be measured from that of the film. For the determination of the diameters in the lateral plane at the inlet (true conjugate), and at the outlet (antero-posterior diameter) I have used the method of Chassar Moir:—

A metal rod bearing an  $\frac{1}{2}$ -inch scale is placed on to the natal cleft of the patient's buttocks, and the patient is X-rayed in the erect lateral position. The length of the conjugate is measured on the film with callipers, and this applied to the film image of the metal rod enables the conjugates to be read off immediately (fig. 12: see plate facing p. 51).

To determine the level of the inlet and outlet planes of the pelvis for measuring their transverse diameters many different methods have been evolved. Readers who are especially interested in this subject are referred to the work of Rohan Williams (1946) and Chassar Moir (1946).

At University College Hospital I have abandoned the "positioning" method, in which the examiner has to determine the level of the inlet plane, either the level of the symphysis pubis or the spinous process of the 4th lumbar vertebra. As this estimation must necessarily carry a large margin of error, a parallax method has been adopted which eliminates the human factor by taking stereoscopic films and adopting geometric principles to find the plane of the pelvis or foetal head. This method allows the transverse diameters of both the inlet and outlet planes to be determined from one view only (fig. 13). Tables covering a wide range have been prepared, and the accuracy of the method has been checked by investigating human dried pelvic specimens (fig. 14) and by measuring the foetal head diameters immediately after delivery by Cæsarean section.

#### STUDY OF THE PLACENTAL SITE

This is called for in *ante-partum hæmorrhage* when the differential diagnosis between accidental hæmorrhage and an abnormally placed placenta is difficult. In good quality skiagrams it is sometimes possible to visualize the



hydrops form) there are no skeletal changes, but Javert (1942) has drawn attention to three X-ray signs:—

(a) The œdema of the scalp causes a "halo shadow" about the fetal skull.

(b) The placental shadow is unusually large.

(c) The fetus assumes the "Buddha position", as the four limbs are splayed away from one another and from the body by the enlarged abdomen.

In cases of erythroblastosis fetalis in which prenatal endochondral bone formation is interfered with, transverse bands of increased and diminished density develop in the ends of the shafts. Caffey (1945), and Follis and his colleagues (1942), found diffuse sclerosis of the shaft in five cases.

### THE MATERNAL PELVIS

It is a well-established fact that the type of pelvis exerts an appreciable effect on the mechanism of labour, and in recent years extensive studies on this subject have been made in America (Caldwell and Moloy, 1933) and this country (Chassar Moir, 1946; Rohan Williams, 1946). Some enthusiastic workers have advocated routine examinations for pelvimetry in all primiparas, but this is a time-consuming and costly procedure and it would be reasonable to restrict X-ray examination to those primiparous cases in which clinical examination suggests some significant anatomical variations and to multiparas in whom there is the history of a previous difficult labour. Rohan Williams (1946) also advocates radiological examination during labour, as at that stage fetal-pelvic relationship can be studied to the best advantage. Caldwell and his colleagues give the following morphological classification:—

(1) *Anthropoid pelvis*.—(long narrow oval pelvis) also called "transversely contracted" or "assimilation" pelvis.

(2) *Gynecoid pelvis*.—(round pelvis).

(3) *Flat or platypelloid pelvis*, with a short antero-posterior and a long transverse diameter (fig. 10).

(4) *Android pelvis* (wedge-shaped pelvis), the widest transverse diameter being at the promontory.

As a rule the human female pelvis does not conform to a pure "parent" type but falls into a mixed or borderline group.

Gross pelvic abnormalities can usually be shown in routine skiagrams. Stereoscopy may give further help. Roberts (1938) gives the following classification of these abnormalities:—

#### (A) *Congenital abnormalities*

(a) Generally contracted pelvis

(b) Simple flat pelvis

(c) Assimilation pelvis

(d) Roberts's pelvis

(e) Generally enlarged pelvis

(f) Split pelvis

#### (B) *Acquired abnormalities*

(1) Disease or injury of the pelvic bones

(a) Rickets. (i) Rachitic flat pelvis

(ii) Rachitic flat and generally contracted pelvis

(iii) Irregularly contracted rachitic pelvis

- (b) Osteomalacia
- (c) New growths
- (d) Fracture
- (e) Atrophy, caries, necrosis
- (2) Disease or injury of the pelvic joints
  - (a) Synostosis of the pelvic symphysis
  - (b) Synostosis of one or both sacro-iliac joints
  - (c) Synostosis of sacro-coccygeal joint
  - (d) Exaggerated movement or separation of pelvic joints
- (3) Disease or injury of the hip joints or lower limbs
  - (a) Coxitis
  - (b) Luxation of the head of one or both femora
  - (c) Absence or deformity of one or both lower extremities
- (4) Spondylolisthesis: progressive slipping of the vertebral body with the anterior portion of the neural arch over the superior surface of the sacrum (fig. 11).

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#### STUDY OF THE PLACENTAL SITE

This is called for in *ante-partum hæmorrhage* when the differential diagnosis between accidental hæmorrhage and an abnormally placed placenta is difficult. In good quality skiagrams it is sometimes possible to visualize the

placenta without a contrast medium. The normal placenta may be seen as an opacity merging with the shadow of the uterine wall and separated from the fetal bones by a clear zone due to vernix caseosa and fetal subcutaneous fat.

Suspected *placenta prævia* can be investigated radiologically without harmful effects by injection of air or a 5 per cent. solution of sodium iodide into the bladder.

Antero-posterior oblique and lateral skiagrams should be taken and the fetus well pushed down into the pelvis at the time of the radiological exposure. This ensures that the gap between the fetal presenting part and the upper surface of the bladder is caused only by the uterine wall, which normally should not exceed 1 cm. in thickness. When an abnormally placed placenta is interposed the space will be considerably increased, either symmetrically or asymmetrically.

Another method of demonstrating an abnormally placed placenta is by the injection of opaque material into the amniotic fluid (amniography). This renders the amniotic fluid opaque and demonstrates the placenta as a filling-defect in the amniotic shadow. Placentography (injection of thorium dioxide or other contrast medium into the maternal blood stream with a view to its excretion) has been used with diagnostic success, but there are risks attached to both amniography and placentography and they are now seldom used.

#### THE URINARY TRACT IN PREGNANCY

Intravenous urography is of great value in the investigation of the urinary tract in pregnancy, especially in pyelitis. In a normal pregnancy, there occurs a dynamic dilatation of the kidney lumen and ureters; the degree of dilatation is not great and is more marked on the right side (fig. 15). Urinary clearance is slow and the contrast medium may be visible in the kidneys and ureters an hour or two after the intravenous injection. Pressure by the uterus is the commonly accepted explanation of this phenomenon. After parturition the urographic appearances soon return to normal.

In the *pyelitis of pregnancy* the dilatation is more marked and may reach the stage of well-marked hydronephrosis with accompanying considerable delay in clearance.

I wish to convey my thanks to Dr. S. Cochrane Shanks, the Hon. Director of the Department, for his cooperation and advice in the writing of this article.

#### References

- Caffey, J. (1945): "Pediatric X-Ray Diagnosis," Year Book, Chicago.  
 Caldwell, W. E., and Moloy, H. C. (1933): *Amer. J. Obstet. Gynec.*, **26**, 479.  
 Follis, R. H., Jun., Jackson, D., and Carnes, W. H. (1942): *J. Pediat.*, **21**, 80.  
 Javert, C. T. (1942): *Surg. Gynec. Obstet.*, **74**, 1.  
 Moir, J. Chassar (1946): Browne's "Antenatal and Postnatal Care", 6th edition, London.  
 Roberts, R. E. (1938): "A Textbook of X-Ray Diagnosis," London.  
 Roberts, T. Boyd (1944): *Amer. J. Roentgenol.*, **51**, 631.  
 Williams, E. Rohan (1946): "Recent Advances in Obstetrics and Gynaecology" (Bourne and Williams), 11th edition, London.

# THE PUERPERIUM

By J. H. PEEL, B.M., F.R.C.S., F.R.C.O.G.

*Obstetric and Gynaecological Surgeon, King's College Hospital.*

WITHIN the space of a short article it will be impossible to give a comprehensive survey of the whole puerperium, normal and abnormal. I shall therefore try to stress some of the points which I consider to be of interest in the practical management of this important phase of maternity work. The gynaecological departments of the hospitals continue to be peopled by patients suffering from disorders which date from child-birth, many of which could have been minimized if not entirely prevented by adequate care during the puerperal period. It is true that many of these conditions are the result of complications arising towards the end of pregnancy and during the course of labour; much, however, can be achieved during the puerperium to reduce the consequences of these complications.

## THE IMMEDIATE POST-PARTUM PERIOD

Unless the labour has been a very stormy one the first forty-eight hours are relatively uneventful. The possibility of *post-partum eclampsia* must not be overlooked if the patient has had preeclamptic toxæmia of any severity. Adequate sedation with phenobarbitone or chloral is indicated in such cases. Magnesium sulphate, 10 c.cm. of a 20 per cent. solution, and calcium gluconate, 10 c.cm. of a 10 per cent. solution, may be administered twice daily in the most severe cases to promote diuresis, assist nervous sedation and to protect the liver. This is rarely necessary once delivery has been accomplished. Liberal fluids may be administered by mouth, and only in exceptional cases of oliguria need intravenous saline be employed.

During this period the administration of ergot preparations and prophylactic chemotherapy need consideration. Ergot is best administered as a tablet of ergometrine, 0.5 mgm., three times daily. This should be employed only if there is a tendency to poor tone in the uterine muscle with clot retention and consequent after-pains, if pieces of chorion or a tiny fragment of placenta have been retained, and following Cæsarean section. The action of ergot in producing tonic spasm and consequent ischæmia contra-indicates its routine employment; it has no influence on the course of involution of the otherwise normal uterus (Chassar Moir and Russell, 1943).

*Prophylactic chemotherapy* should be employed only if the labour has been of such a character that sepsis of some degree is almost inevitable. If prophylaxis is indicated, adequate dosage of a sulphonamide preparation should be employed, e.g. sulphadiazine, 2 gm., followed by 1 gm. four-hourly, together with 60 grains (4 gm.) of sodium bicarbonate and liberal fluids. Apart from hæmorrhage, prolonged labour culminating in forceps

delivery, and Cæsarean section are the two most important predisposing causes of infection. In many such cases anaerobic streptococci are the responsible infecting organism, often associated with *Staphylococcus albus*. These anaerobic streptococci are quite unaffected by any of the sulphonamide drugs and so the prophylactic use of penicillin, in doses of 30,000 units three-hourly, as well as the sulphonamide drugs, is often indicated. The prophylactic use of small doses of a sulphonamide drug alone is utterly useless and may be positively harmful by inducing sulphonamide resistance in the bacteria already present.

Another not uncommon complication of the first two days is *urinary retention*. Acute, complete retention is relatively uncommon, apart from gross local trauma, but incomplete emptying of the bladder is often overlooked. The kidneys are excreting extra fluid during the early stage of the puerperium in order to get rid of the tissue œdema and hydræmia of pregnancy. Hence urinary output may be in excess of intake. Local factors may cause partial retention; so that the passage of a catheter for residual urine may be necessary on the second morning. Carbachol, 1 c.cm., is valuable for acute retention, and it may be given twice daily in cases of partial retention.

In cases in which the baby has been still-born, or breast feeding is contra-indicated, *inhibition of lactation* may be achieved by the administration of stilbæstrol, which suppresses the formation of prolactin by the pituitary. Dosage should start with 15 mgm. and be reduced by 1 mgm. daily. If the stilbæstrol is stopped suddenly or too soon the breasts may fill up, even after a fortnight.

#### THE LATER PUERPERAL PERIOD

The third and fourth days are the most critical of the puerperium. The onset of lactation may be associated with an acute prelactational engorgement. Treatment by support to the breast, avoidance of overstimulation by the baby, and sedation, is all that is necessary in most cases. Overtreatment should be avoided, but in severe cases relief may come from an ice pack and the administration of stilbæstrol, 10 mgm. hourly, for six to eight hours.

*Infection of the genital tract.*—It is in these days that the uterus becomes invaded by organisms from the vagina, and infection of the genital tract manifests itself. Colebrooke's original work (1936) demonstrated that in 60 to 70 per cent. of cases of severe genital tract infection the responsible organism was a group A hæmolytic streptococcus of exogenous origin, and this work has been confirmed many times subsequently. However, the frequency of infection with anaerobic organisms (streptococcus) in cases associated with local trauma or retained products must not be forgotten. Consequently in all these cases of suspected genital tract infection a vaginal swab, a catheter specimen of the urine and a throat swab should be taken and the patient given sulphonamide drugs and penicillin. The swab will reveal the exact organism, but time should not be wasted before starting chemotherapy. The sulphonamide drug can be changed if the bacteriological

report indicates such alteration. The need for removal of perineal stitches at this stage must be borne in mind if there is any local evidence of infection of the laceration, so that free drainage can be established. The instillation of glycerin with 5 per cent. sulphathiazole into the vagina has proved useful in the treatment of infected lacerations of perineum and vagina.

*Venous thrombosis.*—During the third and fourth day, thrombosis of pre-existing varicose veins often occurs in multiparous women. The value of heparin and dicoumarin in the prophylaxis of this annoying complication is at present *sub judice* (Douthwaite, 1944). It would seem reasonable to start the administration of dicoumarin twelve to fourteen hours following delivery in patients with extensive varicosities. This new drug acts by prolonging the prothrombin time; it takes from twenty-four to seventy-two hours from the start of administration before any effect is produced: 300 mgm. should be given on the first day and subsequently 200 mgm. per day. It must be remembered that this drug is capable of producing dangerous hæmorrhage from the uterus, subcutaneous hæmorrhages, bleeding gums and other hæmorrhagic states. It should only be used if it is possible to have daily estimations of the prothrombin time. If the prothrombin times reaches 35 seconds the dicoumarin should be stopped at once. Its effect may last from two to ten days after cessation of its administration. The only adequate antidote to overdosage is blood transfusion. Vitamin K is of no value for this purpose. If venous thrombosis occurs before dicoumarin has been given, heparin may be given for two days in conjunction with dicoumarin which, as already mentioned, takes forty-eight hours to produce its effect on the prothrombin time. It should be given in doses of 2,000 units six-hourly by intravenous injection. It should be emphasized again that the clinical value of these two drugs has not yet been assessed adequately, but they promise to be useful in combating venous thrombosis in the puerperium.

During the fifth to the tenth day, breast feeding should become fully established and the patient should be put through the routine of *rehabilitating exercises*. I am completely unconvinced by the arguments in favour of the patient being out of bed during those days. On the other hand freedom of movement in bed should be encouraged from the earliest day of the puerperium, and after the fourth day a routine of breathing, limb, abdominal and pelvic floor muscle exercises should be established. This combination of rest and exercises rehabilitates the patient's muscular system and the pelvic floor and uterine ligaments are not strained by the weight of the bulky puerperal uterus which must inevitably occur from the assumption of the upright position too soon. But these are days in which we are often confronted by *delay in involution of the uterus* and the "niggling temperature". Often these two go together, indicating invariably a low-grade infective process. Cervical and vaginal vault lacerations are often the primary point of entry of the infecting organism. Chronic cervicitis, subinvolution and parametritis are all too frequently the sequel of this condition in the puerperium. In the circumstances it is most important not to allow the

delivery, and Cæsarean section are the two most important predisposing causes of infection. In many such cases anaerobic streptococci are the responsible infecting organism, often associated with *Staphylococcus albus*. These anaerobic streptococci are quite unaffected by any of the sulphonamide drugs and so the prophylactic use of penicillin, in doses of 30,000 units three-hourly, as well as the sulphonamide drugs, is often indicated. The prophylactic use of small doses of a sulphonamide drug alone is utterly useless and may be positively harmful by inducing sulphonamide resistance in the bacteria already present.

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FIG. 3.—Normal cystogram. Space between fetal head and bladder is narrow and even.

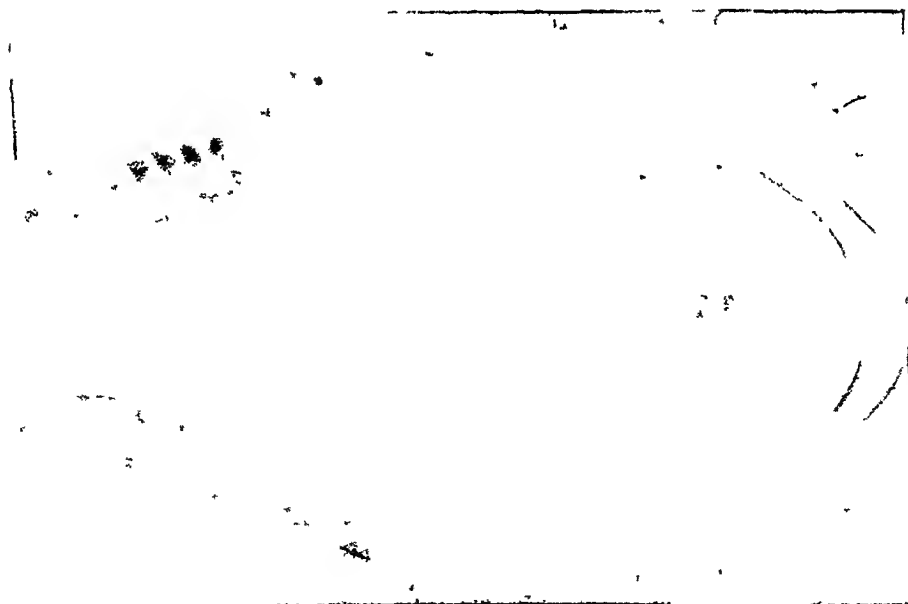


FIG. 2.—Displacement of the fetal head to one side by placenta lying in the lower segment of the opposite side.



patient up until even the slightest pyrexia has settled. In cases of delayed involution, intrauterine glycerin with 5 per cent. sulphathiazole may be of value but only if the lochial discharge appears to be held up or there is evidence of some retained membrance. The value of ergot is doubtful, unless hæmorrhage is freer than it should be, or again, positive evidence of retained products exists. Douches are contraindicated until the cervix is closed at the end of the second week. Chemotherapy may help to combat these mild infections but it is wiser to wait until culture has revealed the nature of the infecting organism. It cannot be emphasized too strongly that a low-grade infection is nearly always the cause of these slight pyrexias and that they should consequently be regarded seriously. They may flare up in the second week as pelvic cellulitis or thrombophlebitis, or pass on to a chronic cervicitis, subinvolution and parametritis, with all the consequent ill-health that goes with those conditions. Femoral thrombosis, when it occurs, is nearly always preceded by local pelvic infection, and manifests itself about the tenth day. The other predisposing cause is anæmia. The ideal would be for every patient to have a hæmoglobin examination at the end of the first week of the puerperium. A large number of women leave their beds and hospitals after confinement with an undetected but marked anæmia; their recovery and their ability to breast feed successfully are thereby hampered.

#### THE FINAL VAGINAL EXAMINATION

Lastly comes the final vaginal examination. Its object is to detect proper healing of lacerations; incipient vaginal wall prolapse and stress incontinence of urine; laceration and potential infection of the cervix; the degree of involution of the uterus and its position. At fourteen days the uterus is often found in the retroverted position. This is usually too early to insert any form of pessary after correction, but it is too late if this important step is left until the final postnatal examination at six to eight weeks. By then the harm to involution of both uterine muscle and its supporting structures is done. I always see the patient at the end of the third week, having instructed her to lie on her face when sleeping and to continue with pelvic floor exercises. Often the uterus is then in the correct anteverted position. If not, it is corrected and a pessary put in for one month: it may then be removed. Involution is complete and it usually matters little what position the uterus takes up after that, but untold harm can come of leaving it in the retroverted position during that important month. During that month too, if practicable and necessary, faradism may be given to the abdominal muscles and to the levatores ani to improve their tone and prevent subsequent visceroptosis and pelvic floor prolapse.

#### References

- Colebrooke, L. (1936): *J. Obstet. Gynec.*, 43, 691.  
 Douthwaite, A. H. (1944): *Guy's Hosp. Gaz.*, 58, 91.  
 Moir, J. Chassar, and Russell, C. Scott (1943): *J. Obstet. Gynec.*, 50, 94.

# THE CARE OF THE NEWBORN

By F. M. B. ALLEN, M.D., F.R.C.P.

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Royal Maternity Hospital, Belfast.*

THE first four weeks of life, referred to as the neonatal period, is acknowledged to be the most critical phase of human existence. The extent of the neonatal death rate as recorded in the Registrar-General's reports has been described as "pathetic, discreditable and unnecessary", and any special measures which can be taken to provide better care for the newborn will not only add credit to the professional skill of obstetricians and pædiatricians, but will assist in increasing human happiness and the welfare of the infant and child.

The care of the new-born infant is an obstetric problem as well as a pædiatric one. Study of the illnesses of infants in the first few days of life, accompanied by skilled pathological reports on post-mortem material, demonstrate that the obstetrician has not fulfilled the high functions of his art by "delivering a living child"; he must pass on to the pædiatrician a human subject who is not destined to be maimed or ill because of some error in obstetric technique or lack of appreciation of factors in the birth of the baby which can lead to serious or even fatal illness.

## ANTENATAL CARE

It can truly be said that the care of the new-born infant begins in the antenatal period and is continued through the act of birth. The maintenance of the nutrition of the mother is important in helping to secure the birth of a healthy, mature infant, suitably endowed with minerals and vitamins, and with the other essentials for survival. Attention to her breasts and suitable propaganda will help to ensure natural feeding of her infant. The early detection of toxæmia will reduce the risk of prematurity, still-birth or neonatal death from this cause.

It should be recognized, moreover, that certain obstetric practices and emergencies arising during labour, increase the risk to the infant. Early rupture of the membranes, spontaneous or induced, conduces to infection of the placenta and eventual sepsis in the child; placenta prævia is an added risk to the baby, and encourages the more general use of Cæsarean section; complications such as persistent occipito-posterior presentation or breech delivery may, in the hands of the inexperienced obstetrician, jeopardize the welfare and even the survival of the infant.

## CARE DURING DELIVERY

The act of birth provides opportunities for unfavourable influences related to the new-born baby. Even the mature infant is fragile, with bones which readily break, skin which is easily damaged, blood vessels the integrity of



taminating the umbilical stump by polluted bath water; moreover, olive oil is adequate for cleansing purposes. When the eyes have been treated with penicillin solution and a physical examination made, the baby should be dressed in simple, loose clothes, avoiding the constriction of numerous tapes, and omitting the application of a tight binder, as a simple bandage to retain the cord dressing is all that is necessary.

The room selected for the nursery should be warm and well ventilated, a temperature of 70° F. (21.1° C.) being maintained for a few days. The humidity of the room should be kept at about 60; when the atmosphere is too dry there is excessive loss of moisture and consequent discomfort. An exposed expanse of water, in a large shallow tray or a filled wash-hand basin, is a suitable means of increasing the humidity.

#### SEPSIS NEONATORUM

One of the greatest risks to the new-born infant is that of infection, which commonly gains entrance by the respiratory or alimentary tracts, the umbilicus, or the skin. Infection of the respiratory tract may involve the tonsils, the bronchial tree or the alveoli, resulting in widespread septic bronchopneumonia. Alimentary infection may result from the swallowing of infected material from a septic fissure of the nipple, from mastitis, or from a dirty feeding bottle or teat; or the infection may arise in the mouth as a thrush stomatitis, spreading to the œsophagus, where secondary organisms flourish and cause septicæmia. Infective organisms can spread from the umbilicus along the obliterated umbilical vessels to the liver, thence gaining entrance to the blood stream and causing septicæmia.

*Symptoms.*—Septic infection of the newborn is recognized by a raised temperature (although this is not invariable), increased respiration rate, vomiting, diarrhœa, irritability, disinclination to feed, loss of weight, jaundice and the general features of toxæmia; œdema of the newborn is often the sole manifestation of sepsis. The organisms concerned are generally staphylococci or streptococci, although others, such as *B.coli* and Friedländer's bacillus, may be present.

*Chemotherapy.*—Sulphonamides and penicillin are effective when sensitive organisms are responsible. Sulphamezathine or sulphadiazine may be given in dosage of one-quarter or one-half of a tablet (0.5 gm.) every three or four hours. Penicillin is effective by mouth: 80,000 units may be given in the twenty-four hours, in three-hourly doses.

*Prevention.*—Sepsis, however, should not arise, if appropriate precautions are taken to avoid its occurrence, recognizing that the respiratory and alimentary tracts are very obvious portals of entry, and that the umbilicus is a surgical wound. Attendants on the new-born infant should wear a gown and mask, and exercise full aseptic technique in all contact with the baby. Visitors should be prohibited, and full recognition should be given to the fundamental fact that the new-born baby has little or no resistance to septic invasion.

which is none too secure and a relatively large surface area which provides an expanse of skin through which heat loss can be considerable. Fractured bones fortunately heal successfully without resulting disability; the skin can be treated gently so that it is not abraded and so exposed to infection, and the fragility of the blood vessels borne in mind so that undue strain is not put upon them. Good technique in the labour ward will secure that the infant is delivered in a warm room, not allowed to be exposed without protection, and transferred immediately to a warm cot. The nervous system, particularly the brain, but to a less extent the spinal cord and some of the important distributing centres, such as the brachial plexus, are, however, always subject to stresses during birth, and even normal deliveries are occasionally followed by serious consequences. By the discovery of vernix, meconium and liquor amnii in the pulmonary alveoli, pathologists have shown that neonatal pneumonia in the first two or three days of life is usually the result of the inhalation of infected material into the lungs of the fœtus before or during birth. Good obstetricians will therefore avoid the occurrence of fœtal distress, and so reduce the risk of premature inspiration.

#### IMMEDIATE POSTNATAL CARE

When the baby is born, it should be wrapped in sterile gamgee to avoid exposure and abnormally low temperatures. When the cord has ceased to pulsate it should be cut, and the child placed in a basket surrounded by hot-water bottles or in an electrically heated cot. Gonorrhœa is not so common as it used to be and the general use of silver nitrate preparations is not so imperative; but in institutional midwifery it is advisable to continue with prophylactic measures, and a few drops of freshly prepared penicillin solution (1,000 units per c.cm.) are effective and avoid the local reaction which sometimes occurs with silver nitrate preparations.

*Examination of infant.*—It is good routine practice to make a physical examination of the new-born infant before transferring it to the nurse's care. Superficial inspection may reveal defects of the limbs, malformations of the extremities, and conditions such as hare-lip or cleft palate. Auscultation of the heart cannot always be relied upon to exclude malformations, but should not be omitted for this reason; it should be remembered that less than half the cases of congenital heart disease are associated with cyanosis. Every infant should be examined for patency of the anus, as it is a humiliating experience to have to inform parents on the second or third day of the presence of a congenital anomaly which, if not incompatible with life, is at the best destined to determine a life of invalidism. Auscultation of the lungs will define the extent of their aeration and the presence of a degree of atelectasis likely to cause the development of asphyxia.

*The infant's first toilet* should be gentle and simple. The excess vernix caseosa should be gently removed with cotton-wool and olive oil, as the remainder is gradually absorbed and need not be removed. Bathing can be omitted until the cord is separated, as there is always the risk of con-

taminating the umbilical stump by polluted bath water; moreover, olive oil is adequate for cleansing purposes. When the eyes have been treated with penicillin solution and a physical examination made, the baby should be dressed in simple, loose clothes, avoiding the constriction of numerous tapes, and omitting the application of a tight binder, as a simple bandage to retain the cord dressing is all that is necessary.

The room selected for the nursery should be warm and well ventilated, a temperature of 70° F. (21.1° C.) being maintained for a few days. The humidity of the room should be kept at about 60; when the atmosphere is too dry there is excessive loss of moisture and consequent discomfort. An exposed expanse of water, in a large shallow tray or a filled wash-hand basin, is a suitable means of increasing the humidity.

#### SEPSIS NEONATORUM

One of the greatest risks to the new-born infant is that of infection, which commonly gains entrance by the respiratory or alimentary tracts, the umbilicus, or the skin. Infection of the respiratory tract may involve the tonsils, the bronchial tree or the alveoli, resulting in widespread septic bronchopneumonia. Alimentary infection may result from the swallowing of infected material from a septic fissure of the nipple, from mastitis, or from a dirty feeding bottle or teat; or the infection may arise in the mouth as a thrush stomatitis, spreading to the œsophagus, where secondary organisms flourish and cause septicæmia. Infective organisms can spread from the umbilicus along the obliterated umbilical vessels to the liver, thence gaining entrance to the blood stream and causing septicæmia.

*Symptoms.*—Septic infection of the newborn is recognized by a raised temperature (although this is not invariable), increased respiration rate, vomiting, diarrhœa, irritability, disinclination to feed, loss of weight, jaundice and the general features of toxæmia; œdema of the newborn is often the sole manifestation of sepsis. The organisms concerned are generally staphylococci or streptococci, although others, such as *B.coli* and Friedländer's bacillus, may be present.

*Chemotherapy.*—Sulphonamides and penicillin are effective when sensitive organisms are responsible. Sulphamezathine or sulphadiazine may be given in dosage of one-quarter or one-half of a tablet (0.5 gm.) every three or four hours. Penicillin is effective by mouth: 80,000 units may be given in the twenty-four hours, in three-hourly doses.

*Prevention.*—Sepsis, however, should not arise, if appropriate precautions are taken to avoid its occurrence, recognizing that the respiratory and alimentary tracts are very obvious portals of entry, and that the umbilicus is a surgical wound. Attendants on the new-born infant should wear a gown and mask, and exercise full aseptic technique in all contact with the baby. Visitors should be prohibited, and full recognition should be given to the fundamental fact that the new-born baby has little or no resistance to septic invasion.

## CEREBRAL TRAUMA

*Cerebral œdema* probably results from bruising of tissues and is not as a rule serious, apart from causing some irritability for the first few hours. *Intracranial hæmorrhage*, however, usually causes death, although it is held by some that spastic paralysis, epilepsy and mental deficiency may occur in those who survive. The bleeding usually occurs in one of the sinuses, due to tearing of the dura with the extravasation of blood over the cerebral hemispheres or into the subtentorial areas. This results from the misdirection of the natural uterine forces, or from gross trauma due to attempts to deliver the fœtus with or without forceps in cases of disproportion. Precipitate delivery may result in multiple intracerebral hæmorrhages or in a tentorial tear. The premature infant, due to its immaturity and also to the rigidity of the maternal passages, is more liable to cerebral hæmorrhage. It has been shown that the skilled application of forceps does not increase the risk of bleeding and indeed in many cases is responsible for the safe delivery of an infant who would otherwise be subjected to an unduly prolonged labour. It is generally recommended that vitamin K should be given to an infant delivered by forceps, or to one who has had a difficult delivery; it may be given as "kapilon", orally, 5 or 6 drops four-hourly, or as "synkavit", by injection, one ampoule daily (equivalent in either case to 10 mgm. in the day). Vitamin K should also be given to the mother when labour has been prolonged for more than eighteen hours in a primigravida.

Attention has recently been directed to the occurrence of a less dramatic type of intracranial hæmorrhage, the *subdural hæmatoma*. This is generally believed to arise from the tearing of small cortical veins where they enter the superior longitudinal sinus; there may be few or no clinical manifestations at the time, but subsequently a cyst results and, growing by osmosis, produces the signs of a space-occupying lesion inside the skull. Fortunately these hæmatomas carry a good prognosis, provided the diagnosis is made in time for surgical treatment.

## ASPHYXIA; RESPIRATORY DISTRESS

*Obstruction in the respiratory tract* due to mucus or inhaled uterine contents accounts for a large number of cases, and the degree of asphyxia (and the prognosis) depend upon the accessibility of the obstructing material to removal and the proportion of lung tissue which is incapable of functioning. In the pharynx and larynx, mucus can usually be removed, but in these cases, as well as in those in which there is much mucus in the bronchial system, the foot of the cot should be raised six inches and the position of the baby changed every fifteen minutes to ensure drainage by gravity. It is good practice to dispense with a pillow for all new-born infants, and to raise the foot of the cot as described for at least six hours, irrespective of the absence of apparent asphyxia.

As already mentioned, asphyxia may be the result of *broncho-pneumonia* caused by the inhalation of infected uterine contents before birth or by the carelessness of an attendant after birth.

*Depression of the respiratory centre* due to lack of  $\text{CO}_2$ , damage to the centre or overdosage in the premedication of the mother may occur. Lobeline, 3 to 4 minims (0.18 to 0.26 c.cm.) of a solution of 3 mgm. in 1 c.cm., by intramuscular injection, combined with the administration of 93 per cent. oxygen and 7 per cent. carbon dioxide mixture by intranasal inhalation or a baby-type oxygen tent, is indicated. All authorities are agreed in condemning attempts at artificial respiration by physical means and it is now accepted that many infants would have survived if gentler and less heroic measures were practised.

### VOMITING

Vomiting in the newborn may be the first indication of a *congenital obstruction of the alimentary tract*, commonly partial or complete occlusion of the duodenum. The diagnosis can be confirmed by X-ray examination, and a gastro-enterostomy should be performed, preferably under local anaesthesia. *Congenital maldevelopment of the œsophagus* also accounts for vomiting, and in those cases in which there is an associated fistulous communication with the bronchus the baby rarely survives more than a few days. Attention has already been drawn to *imperforate anus*, but this condition should have been discovered before the clinical features of intestinal obstruction arise.

Happily a more innocent cause accounts for some cases of vomiting in the neonatal period. Apparently, uterine contents which have been swallowed can cause local gastric irritation and pyloric spasm which result in vomiting of the projectile type suggestive of organic obstruction. Stomach lavage or the administration of a barium meal often overcomes the vomiting and a dramatic cure ensues.

*Congenital pyloric stenosis* does not usually enter into the possible considerations of the diagnosis of vomiting in the newborn, as the onset usually occurs from the third week on. However, if the baby has been retaining its feeds for a week or more and then begins to vomit it should be considered. The vomiting soon assumes a projectile character and is accompanied by loss in weight, constipation, and the demonstration of visible peristalsis and a palpable pyloric tumour.

### FEEDING OF THE NEWBORN

The undoubted superiority of breast feeding over artificial feeding is clearly shown by the greatly reduced mortality and morbidity rates of the breast-fed infants in comparison with those who are bottle-fed. Other considerations resulting in the same conclusion are the composition of the milk, its bacterial purity, and its convenience; from the mother's point of view, there are the advantages of better involution of the uterus, and a psychological re-



action which is of supreme importance. After a normal delivery the baby should be put to the breast after six hours for a minute or two; in the event of a difficult or prolonged delivery an interval of twelve hours or more should elapse. The practice of giving glucose solutions for the first two or three days has nothing to commend it, and may even discourage the infant from nursing from the breast, by inducing a preference for the teat and bottle. By the third day the baby should be fed every three hours, or in the case of larger, more robust infants, every four hours. The interval between feeds is not of great importance so long as it is recognized that the baby must have sufficient opportunities to obtain the required amount of milk to nourish it (two-and-a-half ounces per pound body weight per day).

It is during the first few weeks that infants are most frequently weaned unnecessarily. It should be recognized that a good supply of milk depends to a large extent upon a robust nursing infant who empties the breast completely. Therefore if the baby is tired or is obstructed in its efforts by defects of the nipple, or is disinclined to feed because of jaundice, the mother's milk may not appear in quantity or may "leave her when she gets up". Antenatal treatment of the breast and nipple of the primiparous mother are of great value, but a proper understanding of the known factors of lactation in the early weeks after delivery is equally important. There is no evidence that the consumption of large quantities of fluid by the mother has any influence upon the supply of milk; in fact many mothers object to the practice and only submit while under the supervision and "management" of a formidable midwife.

#### HÆMORRHAGE NEONATORUM

Bleeding may occur in the first five days of life from the umbilicus, stomach or intestine, or within the cranium. This hæmorrhage is related to the low level of prothrombin in the blood, which is controlled by the presence of vitamin K. The place of this vitamin in the human physiology is not as yet completely understood; but it is known that the infant cannot synthesize it, and has only indifferent ability to store it in the liver. It has been found, however, that if an adequate dose (10 mgm.) is given to the mother two hours before delivery the infant is assured of a sufficient concentration to maintain an adequate prothrombin level in the blood. As mentioned on page 36, vitamin K should be given in all cases of difficult or forceps delivery. When bleeding is first noted, treatment should be instituted at once by the intramuscular route and then by oral administration.

#### JAUNDICE

The so-called physiological jaundice is of no great significance and it is only in cases in which it becomes intense and interferes with the baby's appetite and general alertness that any treatment is called for. A mercurial purge

followed by the administration of glucose, calcium and an alkali are all that is necessary when the jaundice is of severe degree.

The other, more serious causes of jaundice in the newborn are fortunately much less common. In *hæmolytic disease of the newborn*, usually due to rhesus incompatibility, the main features are severe jaundice, with anæmia, arising at or shortly after birth, almost invariably in the second or subsequent child of a marriage. Signs in the child aiding diagnosis are staining of the vernix, enlargement of the liver and spleen, and normocytic anæmia with reticulocytosis and excess of normoblasts. Any or all of these signs may be absent, however, and the final diagnosis rests with the laboratory demonstration of a maternal agglutinin capable of acting on the infant's red cells. It should be noted that only a small proportion of marriages with rhesus incompatibility between husband and wife result in any manifestation of hæmolytic disease in the children (about 1/40), also that in some cases the agglutinin may be of the ABO series.

As soon as the diagnosis has been made, and in severe suspected cases while awaiting laboratory confirmation, treatment should be begun with transfusion of the infant with Rh-negative blood of compatible ABO group. Repeated small transfusions are preferable to occasional large ones, and may need to be continued for several weeks. The advisability of permitting breast feeding in these cases is still being debated; it is generally considered that the known advantages of breast feeding outweigh the possible risks of continued absorption of antibodies and further hæmolysis.

*Jaundice due to septic infection* reaching the liver by the obliterated umbilical vessels usually arises after the first week of life. Other signs of infection, as already detailed, are normally found to assist the diagnosis, and the appropriate treatment should be instituted forthwith. *Jaundice due to congenital syphilis* should not arise if there has been adequate antenatal supervision of the mother; it is not usually marked, and is less noticeable than the other signs of the disease. *Congenital obliteration of the bile ducts*, and the *familial acholuric jaundice* are rare, usually becoming manifest in the latter part of the neonatal period; there is no medical treatment for either condition.

#### THE PREMATURE INFANT

The infant weighing less than five-and-a-half pounds at birth requires special care. The main principles are to maintain body warmth, avoid exposure, prevent infection, and to secure the intake of an adequate amount of nourishment, preferably of breast milk. It may be necessary to feed the infant by tube or a "belcroy feeder" and it is essential to give smaller feeds at shorter intervals than in the case of a normal infant, to ensure that the required calorie value to maintain development is administered without overloading the stomach.

# THE MANAGEMENT OF THE NEW-BORN INFANT: PERSONAL EXPERIENCES

By A MEDICAL WOMAN

At the time of the birth of my first child I suffered the most profound and unexpected anxiety and distress. This I would have passed over as personal inadequacy had not inquiry from friends with children revealed that the greater proportion of them, whether medical or not, had had similar trouble, and inquiry from obstetricians confirmed that such is the rule rather than the exception. I have no reason to suppose that I suffered more than the scores of others who have told me the same story, and if those I have questioned represent a reasonable sample of the population at large the probable summation of human misery over this so-called happy event is simply staggering. I make no excuse for writing after the limited experience of one child for it is only over the first that such trouble usually arises, and were I to postpone my argument until time or more children had dulled the memory of my nightmare it would only be to join the ranks of the inert.

## THE CAUSES OF PUERPERAL DEPRESSION

Four factors seem to me to promote puerperal depression: drain from lactation, hormonal disturbance, lack of sleep, worry over the baby and adjustment to the new relationship.

*The drain from lactation* is easily understood and something of the magnitude of the demands can be appreciated by considering the recommended dietary allowances by the Food and Nutrition Board of the National Research Council. For example, 100 gm. of protein, 2 gm. of calcium and 150 mgm. of vitamin C. are advised for the daily consumption of the nursing mother as against 70 gm. of protein, 0.8 gm. calcium and 75 mgm. vitamin C. for a very active working man two stones heavier in weight. Reference to these recommendations and to a chart of the nutritive value of foodstuffs provides an easy method of assessing any patient's intake and probable requirements.

It is obvious that a considerable *disturbance of hormonal balance* must occur in a system which suddenly loses a baby and placenta and when the uterus involutes and the breasts go into action. Nervous conditions are closely associated with hormonal upsets and this association is confirmed in the case of puerperal depression by the sudden onset, its quite uncontrollable and irrational character, and its limited duration (sometimes weeks, seldom more than months) roughly coinciding with the probable period of hormonal readjustment. This is an enormous subject useless to discuss further on the basis of individual experience and mentioned only for the sake of completeness.

*Worry and lack of sleep* are both largely dependent upon the amount the baby cries. For at least three weeks after leaving hospital two two-hour periods of sleep in the twenty-four were all I achieved and on two occasions my daughter cried for thirteen out of twenty-four hours until her voice petered away into a hoarse whisper. Such a state of affairs would tax a nervous system far more stable than that of the puerperal mother.

#### WHY DOES THE YOUNG INFANT CRY?

Never again will I be persuaded into believing that an infant cries in order to air its lungs. That its lungs are expanded is fortuitous and the only good thing about it, but with the possible exception of the first few days of life, crying is, I am convinced, promoted by discomfort or displeasure. It is not the baby's idea of fun, and as it certainly is not anybody else's it would seem on all counts only sensible to reduce it to a reasonable minimum. If it is felt that daily lung expansion is important, and I would not contradict that, a minute or two before each feed is quite adequate together with the daily bath, which apart from the few moments of actual immersion is a fruitful source of annoyance to all really young infants. To prevent more crying than this some understanding of its causation is necessary, and there appears to be very little. The midwives, whose work I admire greatly, and the standard books on mothercraft, from some of which I have gained much practical help, both seem to me to be misinformed on this subject. It is to these sources that the majority of mothers turn at a time when they are abnormally susceptible to suggestion and the advice they receive is uniform and to my mind, now no longer susceptible, astonishing. That "all babies cry, and some more than others" is true but shelves the problem altogether. That "it is good for babies to cry" I hotly deny, and it is excessively bad for the mother. We are next consistently ordered to let the baby "cry it out". What this means is obscure to me but the only interpretation my experience suggests is that the wretched child must cry until it is too exhausted to make another croak. This remedy is advised (a) if the infant be so greedy as to want food before its proper time and (b) if it be so inconsiderate as to want attention for attention's sake, or, ultimate wickedness of all, to be picked up.

I would like to emphasize that many reasons for crying can only come as the child's horizon enlarges. In the first weeks, for instance, there is no recognition of persons so it cannot cry for a familiar face or for attention, as it will do later. Now it seems to me that at this age the chances of all crying being prompted by *hunger* are overwhelming. Perhaps other forms of physical discomfort are felt, cold or an irksome position, but food is the first essential for life, its acquisition among the most primitive of all instincts and crying the means by which the infant announces its requirements. It is a curious irony which permits a deaf ear to be turned to so sensible a provision.

Later other factors come into play. My daughter has never cried to be

picked up. She has always preferred kicking freely in her cot to being nursed, but she does like company. A familiar face causes her to hug herself with glee while her cot shakes with her low husky laughter. Three or four times a week perhaps she cries for company as distinct from food. Her request is always responded to immediately and the transformation from tears to a radiant welcome does as much good to those around her as her crying once did harm. There is no authority extant who could persuade me to teach her the better of these charming manners or to deprive her of the company she enjoys so much.

#### FEEDING

*Breast feeding.*—It is extremely common for the milk to diminish with the change to home activity from the comparative quiet of hospital; it is extremely common for the infant to become fretful. It would seem reasonable to feed it a little more often, but the advice almost universally given is that regular habits and no night feeding are essential if the child is to keep a good digestion and be prevented from becoming a persistent cry-baby. At first sight this seems plausible enough and for the first ten days I tried to stick to it, for I envisaged feeding time as a conditioned reflex and considered it would be foolish to encourage, for example, a reflex for a two-hourly interval. But the premise is quite false. Eating is conditioned by hunger, not time, and although the two can be made to coincide, obviously hunger takes precedence, especially in the instinctive state of the newborn. One day I witnessed the spectacle of my child deliberately swallowing air in great gulps to distend her wretchedly empty stomach and then I appreciated the extent to which I had starved her. The rapid acquisition of a pair of scales revealed that although her over-all weight gain had not been really inadequate she was often getting only 2 ounces at a feed. Here I would like to emphasize that a baby can be gaining what is considered a reasonable weight and still be ravenously hungry. More important and quite unexpected was the fact that sometimes she did take up to 6 ounces but that it was impossible to tell by any means other than weighing which extreme was in operation. The baby does not necessarily stop feeding when the breast is empty, it often carries on swallowing air. In any case the time taken gives no indication of the amount obtained; vigorous sucklings empty the greater part of each breast in the first three minutes. Milk overflow is of no assistance either, it occurs whether the supply is good or scanty, for it is the result of contraction of the muscle elements in the breast literally squeezing out the milk. One is perfectly conscious of these contractions, their nature is unmistakable and invariably followed by ejection of milk often with surprising force. There is not a teat in existence which can approach the breast in the enthusiasm with which it delivers its goods. Sometimes my daughter had a small feed, for choice leaving some behind, more often it was of necessity; but whether the variation is conditioned by the infant or the mother it is patently absurd to enforce the same interval after a 2-ounce as a 6-ounce feed. Nature has again provided for just this contingency. No one questions

that the greatest stimulation to milk secretion is suction. The baby whose mother has insufficient milk by making more frequent demands both satisfies himself and gradually remedies the situation. Surely the answer to a nursing couple not yet stabilized is for the baby to set the pace rather than to start the elaborate performance of complementary feeds. In the first place its attention can be directed towards the four-hourly interval and doubtless if the milk supply is adequate this regime will suit so long as a reasonably eclectic attitude is maintained. It is when the milk supply is endangered that it is so important to listen to the baby's complaints, and as it is impossible to know from mother to mother, baby to baby, and even feed to feed, when this is occurring *except* by the complaints of the baby the only rational solution is to let the baby choose. Anyone who thinks such a regime too exhausting for the mother has no idea how infinitely more exhausting is a fretful infant.

The possibility of *overfeeding* is often raised as an objection. I have found no convincing evidence that this occurs in any degree—either in the human infant left to its own devices or in the animal world. It is certainly not a common difficulty in the breast-fed first child although it is wise to bear the possibility in mind.

*Night feeding.*—As with the day, so with the night. If an infant cries for a night feed it *needs* one. To refuse it to a hungry baby is not only ridiculous but cruel. The objection to night feeding is apparently the formation of an undesirable habit, but in no one of the six acquaintances who gave night feeds to their new-born babies about the same time as I did was such a habit in fact started. Six of our infants gave it up of their own accord within three or four weeks, the seventh took ten weeks, and my own daughter is now at the age of 7 months sleeping for twelve hours every night. One girl of these six cried with relief when I told her that in my opinion she would not harm her baby by night feeds, for she had been so severely chastised by her "welfare" centre that her overwrought nerves had been torn to shreds between the bigoted "experts" on the one hand and the demands of her baby on the other.

*Artificial feeding* is obviously a solution to many difficulties, for the strain of lactation is removed, loss of sleep can be shared, and the baby's intake is known. The timetable of babies bottle-fed from the beginning is much easier to regulate and requests for night feeding are less common. I do not advance this as a reason for adopting artificial feeding but as evidence that regular feeding is only possible when the quantities given are known.

I did not jump to all these conclusions at once, but so soon as I began to shed the influence of tradition with the aid of an enlightened pædiatrician, just so soon did the infant's troubles begin to subside and her subsequent progress has left no room for doubt in my mind that the views I have expressed are at least worth attention. Had I realized earlier how simple the remedy could have been in the first instance, I am sure I would have avoided the legacy of depression.

# HEAT SPOTS AND SUMMER ERUPTIONS

By JOHN T. INGRAM, M.D., F.R.C.P.

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It is not to be imagined that an influence so potent in the organic world as that of spring time should leave the human animal undisturbed. It is not only that "the young man's fancy lightly turns to thoughts of love", but all physiological processes tend to be roused from a quiescence to lively activity. The skin, no doubt, is not the only organ which responds to this annual surge of life, nor the only organ the functional activity of which is profoundly modified and the response and adaptation of which go far to determine the maintenance of health and the well-being of the subject, but it is a most important organ in this respect. Many of these activities are recognized and in part understood; the altered character and quantity of the secretions of sebum and sweat, the adjustment of vasomotor tone and of heat regulation, the elaboration of essential foodstuffs from the sterols in the skin. It is interesting to speculate as to what activities correspond to the annual sloughing of the skin or moulting of hair, fur and feathers in lower animals. It is the summer season which by the shedding of clothes, of artificial heating and of the house-bound life, brings the human for a while nearer the natural state of existence and health of the animal.

Seasonal influences are quite properly associated in the mind of the laity with a variety of skin eruptions. The pleasures of spring and summer are not always unalloyed and it is generally the more sensitive among the human race, those whose constitutions suggest some physiological instability, who are most readily disturbed. Fairness of hair and fineness or "thinness" of the skin as opposed to the coarse thick-skinned subjects suffer most severely from the direct effects of light, heat, and exposure. But other influences may indirectly affect the skin through seasonal disturbances of gastro-intestinal, metabolic and endocrine function.

## "HEAT SPOTS"

It is only possible in this article to deal seriously with the more common disturbances in this field and among these, "heat spots" would occur first to the lay mind. It is strangely difficult to give a definition of the "heat spot", its clinical features or etiology, for the term figures in few textbooks and is used by the laity to cover a great variety of different lesions.

*Papular urticaria.*—The most common is the lesion of strophulus or papular urticaria—a distinctive eruption of particular pattern, different in

its manifestations from ordinary urticaria of the adult but being in fact the ordinary urticaria of childhood. The ordinary wheals and geographical and dermatographical patterns of adult urticaria are rarely seen in children, but papular urticaria in greater or less degree affects almost all children at some time between the ages of one and five years. The lesion in papular urticaria is an ill-defined, oval, pink wheal resembling a flea-bite, with a firm, pin-head-sized papule in the centre, which may be surmounted by a vesicle or bulla, especially on the legs and palms and soles, and particularly in the very young or sensitive. The limbs and buttocks are the sites mainly affected and the wheals usually appear at night and disappear during the day to leave the papule which may persist with itching for a week or ten days. The resemblance to scabies may be close; the palms and soles—sites of election in scabies—are generally free in papular urticaria, except in the vesicular type. Sepsis is much less common in papular urticaria and burrows and mites are, of course, absent, although it must be remembered that scabies and other parasitic infestations may provoke a secondary papular urticaria. In the vesicular type the eruption may sometimes mimic chickenpox.

As in the adult, the affection is commonly gastro-intestinal in origin, but again, as in the adult, other possible causes are legion and they have to be considered, especially in those cases in which the urticaria is unusually persistent and severe. In such persistent cases, whatever other factors may play a part, there is almost invariably present an unusual degree of emotional or nervous instability, or peculiar psychological stresses or strains in the environmental circumstances, or both, which demand attention. The work of Hallam, who showed that most cases of papular urticaria clear if the child sleeps in hospital—other factors being constant—probably indicates a psychogenic etiology rather than reaction to an allergen.

Papular urticaria is not of course limited to the summer season but it is more prevalent at that time. This may be due to the metabolic effects of increased temperature but it is often related to the altered dietary and to gastro-intestinal or liver dysfunction. It is important to exclude threadworms and constipation; irregularity, indiscretions or ill-balance in the diet must also receive careful attention in treating these cases. Specific food factors may, upon occasion, be responsible, particularly fruits, bananas, ice cream, chocolates, and in any event excess of carbohydrate should be avoided. There would seem often to be a mild state of acidosis present as in cyclical vomiting and it is rarely that a mild aperient and sodium bicarbonate, 20 grains (1.32 gm.) t.d.s., will not correct the trouble.

In resistant cases a nervous factor is commonly present. If the cause is in the child, it may be controlled by the addition of potassium bromide, 5 grains (0.32 gm.), to the rhubarb and soda mixture or by phenobarbitone,  $\frac{1}{4}$  of a grain (16 mgm.); if in the environment, the circumstances must be investigated and, if possible, corrected. No more than calamine lotion is necessary as a local application.



Among the many other lesions described as "heat spots" are solitary or scattered small *nodose erythematous lesions* which itch and occur chiefly on the face or neck or limbs. They last a few days, although they may vesicate and sometimes become pustular. They occur at all ages though more commonly in children and adolescents; they particularly occur in hot weather but are seen at other times. The significance of these lesions would seem to be similar to that of papular urticaria and investigation and treatment are along the same lines.

*Insect bites.*—Bites from insects, harvest bugs, midges, gnats and flies are often described as "heat spots". They are small, erythematous urticarial reactions without a central papule but sometimes showing a central puncture and otherwise resembling the irritable nodose erythematous lesions described above. On the legs they may be capped by vesicles or sometimes by large bullæ. A lotion or cream with 2 per cent. phenol relieves itching, and a repellent application may be used to protect against further bites. Cod-liver oil, oil of citronella and phenol, 2 per cent. of each in an emulsified or non-greasy or jelly base, may be employed for this purpose. Dimethylphthallate (D.M.P.) is also effective. Ephedrine,  $\frac{1}{2}$  grain (32 mgm.) by mouth, has been advocated as a repellent, and more recently the anti-histamine preparations, benadryl, pyribenzamine and neoantergan are claimed to be useful in treatment. These latter drugs have some place at least in the experimental study of the urticarias but must be employed with caution.

*Contact with irritant plants*, such as the nettle, may give this "heat spot" type of eruption, to be differentiated from allergic contact dermatitis evoked by plant sensitiveness.

#### ☛ SUMMER ERUPTIONS PROVOKED BY HEAT

Other eruptions caused by heat in the physiologically sensitive individual include ordinary urticaria and exertion urticaria, sudaminal (sweat) rashes, pompholyx of hands and feet, seborrhœic eruptions of all types, and prickly heat. It is not proposed to discuss these large groups except to state that whether produced by the heat of the climate, from conditions of labour, from exertion or from infective pyrexia, the manifestations do not differ from the similar eruptions which may be caused by emotional, toxic or allergic influences. Pompholyx in particular is more often emotional than thermal in origin and may, in a small proportion of cases in this country, be an allergic reaction from fungous infection of the toes. It should be remembered that the increased amount and character of sweating in hot weather tends to activate a *latent ringworm infection of the toes*, favours its more ready spread by contagion and increases the difficulties of treatment. This can be counteracted to some extent by soaking the feet in a solution of potassium permanganate (1 : 4,000), by careful washing and, above all, by

careful drying of the toes, and by the use of the following dusting powder as a routine toilet measure:—

R		
Sodium hexametaphosphate .....	5 parts	
Salicylic acid .....	2 parts	
Zinc oxide .....		
Talc .....		
Boracic acid .....	aa to 100	
To be made up in the form of a powder.		

The importance of the skin as an excretory organ and as a heat regulating factor in hot weather cannot be overestimated. Inability to sweat, for congenital or other reasons, is associated with serious distress. There is no effective treatment apart from avoidance of heat.

*Hyperhidrosis* can be a source of great inconvenience and of irritation in the hot weather, especially in the young, the obese, and in debilitated and unstable patients. It is in the main countered by appropriate toilet care and clothing. It is important under extreme conditions to maintain an adequate intake of salt to replace what is lost through sweating. American workers have remarked upon the efficacy of benadryl and allied anti-histamine preparations in the control of hyperhidrosis, but this relates to sweating of the hands and feet and axillæ where, although heat may cause aggravation, emotional imbalance is the major factor in etiology.

#### SUMMER ERUPTIONS PROVOKED BY LIGHT

The second important group of eruptions to be considered in relation to this season of the year is that in which light, and especially actinic light, plays an exciting rôle. Reactions are limited to the exposed parts and may take the form of itching or erythema or urticaria or may be of an eczematous character. In mild degrees these eruptions are common and do not call for much comment. A little reasonable care and some mild protective application such as calamine are sufficient to control the trouble.

Some patients, however, and especially the fair, the red-haired and the sensitive, react in an extreme degree to slight exposure. They are particularly sensitive from the month of February to October but in chronic cases the affection may ultimately persist throughout the year. Irritation may occur from light filtered through glass and even through thin garments and is often due to actinic rays very little beyond the blue end of the visual spectrum. The susceptibility frequently starts in early childhood, in which case it may disappear at puberty. Other cases, however, start at puberty or in adult life—sometimes in relation to a pregnancy or to the menopause. The condition is not, of course, limited to the female sex and although foci of infection or emotional shock may sometimes be important causative factors, the etiology of most cases remains obscure. It is presumed that some metabolite in the circulation sensitizes the skin to light.

Some degree of *desensitization*, usually temporary, may be achieved by graduated exposure of the whole body to natural or artificial light. Internal measures have not been helpful although preliminary work with the anti-histamine preparations does offer some hope of success. Certain empirical measures, injections of gold or nicotinamide or vitamin A concentrates, upon occasion give relief, but reliance has, in the main, to be placed upon protective substances applied to the exposed parts of the skin throughout daylight hours.

*Protective applications.*—Soft paraffin is an excellent protection and, used in conjunction with an emulsifying base, can be employed without much discomfort or embarrassment. Titanium dioxide can with advantage be incorporated in this or in a "barrier cream" or in a non-greasy base (as in siccolum, B.D.H.). The powder is a mechanical protection and also diffuses the light, and does not need to be applied so thickly that it is conspicuous. The subsequent use of a powder containing ichthyol increases the efficacy of the protection. There are many protective applications on the market, of greater or less efficiency, mostly containing quinine or tannic acid as barrier against the light.

Cases of *actinic dermatitis* of long standing develop a very characteristic roughened thickening and coarseness of the skin with infiltration, especially across the nose and cheeks. Histological examination shows a dense round-celled infiltration beneath the epidermis. It is of value in such cases to give a course of three or four fractional doses of X-rays (120 r) at monthly intervals, especially at the beginning of the light season. Tar pastes are also of value but must be used with caution for they may aggravate the irritation if, at the same time, the patient is exposed to bright light. It is always difficult to impress upon these patients, young and old, that treatment consists essentially of effective protection to prevent the trouble rather than active treatment of a disease with prospect of cure. It is the same problem as the effective use of barrier creams in industry to prevent dermatitis.

Sometimes the pattern of reaction is more complicated than a simple eczema and assumes the features of a coarse, itching eruption of prurigo papules the size of a split-pea, or of vesicles—*summer prurigo*, or *hydraea aestivale*, or *recurrent summer eruptions* (Hutchinson). The nature of the problem and its treatment is the same.

It is well known that actinic irritation of the skin may play a part in the development of malignant disease, keratosis, basal-celled carcinoma and epithelioma and this is particularly demonstrated when white people are exposed to an unusual amount of sunlight, as in Australia. Upon rare occasions a child is born with a peculiar susceptibility to this type of reaction and before his teens may show gross changes, especially in the face, with the development of multiple carcinomas. The condition is termed *xeroderma pigmentosum* and, in the past, few patients have lived to adult life,

but with more effective protection it is probable that the prognosis is now less grave.

#### OTHER ERUPTIONS INFLUENCED BY SUMMER HEAT AND LIGHT

A number of affections of the skin, in which seasonal influences are not the major etiological factors, are precipitated or aggravated by light or heat; a few are relieved. *Lupus erythematosus* is a toxic, fixed erythema of the face which is frequently evoked by exposure to strong sunlight; many patients will give a history of the affection having followed severe sunburn while on holiday, especially at the seaside. It is always important to warn patients with lupus erythematosus to avoid such aggravation and to provide effective protection of the skin of the face.

*Circulatory disturbances*, on the other hand, acrocyanosis and erythrocyanosis, chilblains and some of the complications of perniosis, such as Bazin's disease, are beneficially influenced by light and warmth and should seek such an environment. The same is true of most tuberculous affections of the skin, *lupus vulgaris* especially, and that is one important reason for avoiding confusion between lupus vulgaris and lupus erythematosus, two entirely different affections of the skin.

The importance of warmth and light is evident in *psoriasis*, a rheumatic type of reaction, and most patients derive benefit from treatment directed along these lines or from residence in a reasonably warm and sunny climate. Extreme heat, on the other hand, as in the tropics, will aggravate psoriasis, but that does not apply in this country. Nevertheless, a small proportion of patients with psoriasis are aggravated by exposure to summer light and heat and are better during the winter season.

In *acne vulgaris*, similarly, reasonable light and warmth are beneficial, as most patients find from holiday experiences, but extremes, as in the tropics, make the condition worse.

It does not need to be emphasized that heat and exposure to strong actinic light will aggravate most reactions of the skin which are dependent upon increased sensitiveness, i.e., pruritus, eczema, seborrhœic dermatitis, urticaria. In all but a small minority of such cases, however, effective treatment is directed towards factors other than the climatic.

# THE TECHNIQUE OF B.C.G. VACCINATION

By K. NEVILLE IRVINE, D.M.

*Medical Superintendent, Smith Isolation Hospital, Henley-on-Thames; Physician,  
Henley and District War Memorial Hospital.*

At long last the B.C.G. vaccine is to be made available in this country. A memorandum prepared by the Joint Committee of the Tuberculosis Association, the Joint Tuberculosis Council and the National Association for the Prevention of Tuberculosis advocating the introduction of B.C.G. has been favourably received by the Minister of Health. In view of this I have been asked to give a comprehensive survey of the whole subject with practical instructions for the use of the B.C.G. vaccine.

Ever since the discovery of the tubercle bacillus by Koch in 1882, efforts have been made to produce a vaccine against tuberculosis. Dead vaccines were tried first but these proved a failure; research was then directed towards live vaccines on the analogy of smallpox vaccination. The great difficulty was to discover a live vaccine which would produce immunity in the patient without any risk of giving the disease itself.

## THE EVOLUTION OF B.C.G.

In 1906, Calmette and Guérin, working in Paris, began to attenuate a bovine tubercle bacillus by laboratory methods; by 1911 they had produced a stable avirulent culture which they named B.C.G. (Bacille Calmette-Guérin); in 1922, after numerous tests on laboratory animals, Weill-Hallé began to vaccinate children in Paris; by 1934 over a million children throughout the world had been vaccinated and I attempted to introduce its use into this country, but without success. In 1947, with the total figure of vaccinated standing at three million, this remains one of the few countries in which the vaccine is unobtainable: caution has ever been the keynote of British medicine.

The progress of the vaccine has not been without its setbacks. In 1927, Petroff in America alarmed the world by producing a return of virulence to the B.C.G. by laboratory methods. Subsequent work has shown, however, that this does not occur in practice and Petroff's work is therefore of academic interest only. A far more tragic incident which caused its greatest set-back was the Lübeck disaster. In the spring of 1930, 249 children were given the B.C.G. vaccine at Lübeck, in Germany; by the end of the summer, 73 had died from tuberculosis, which was shown at autopsy to have originated from the injection given. This incident is still sometimes quoted to show that B.C.G. inoculation is dangerous, but an official inquiry proved that the vaccine had become mixed with a virulent culture of tubercle bacillus in the

R

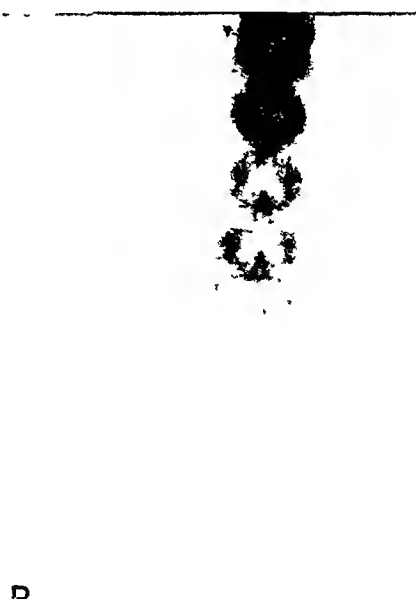
FIG 1.—Dermoid cyst in pregnancy. The teeth are visible.



FIG 2.—Early pregnancy. The crescentic shape of the fetal head is well shown in the pelvis. The fetal spine and limbs are somewhat obscured by the maternal sacrum.



FIG 3.—Breech presentation. The breech is well down in the pelvis, the legs are both extended.



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FIG 4.—Transverse lie. The foot is the presenting part.

FIG. 5.—Twin pregnancy. Both foetuses presenting as vertex.

FIG. 6.—Twin pregnancy. The fore-coming foetus is breech, the after-coming foetus a vertex.

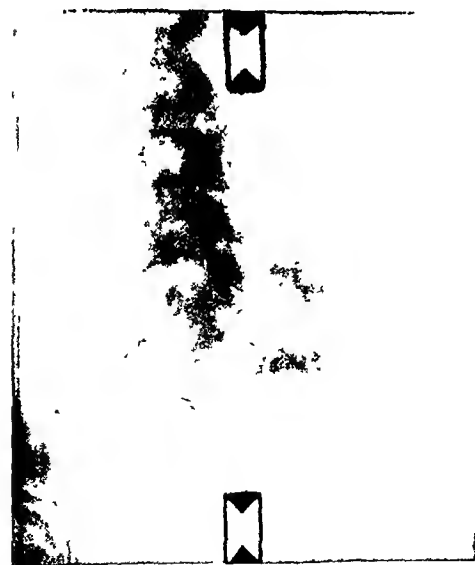


FIG. 7.—Cephalometry. Occipito-frontal diameter of the foetal head, indicated by a white line in the film.



FIG. 8.—Foetal death. The foetal head shows Spalding's sign, with marked overlapping at the sutures. The foetus has assumed a rolled-up attitude.

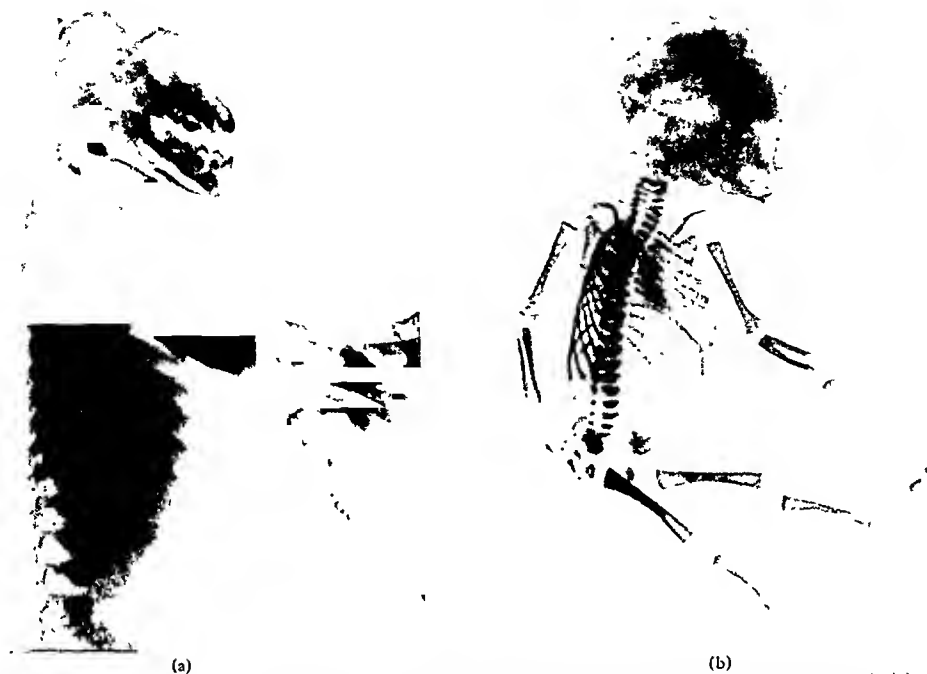


FIG. 9.—Abnormal twin pregnancy showing anencephalic fœtus with absence of cranial vault (a).  
The other fœtus is considerably smaller and compressed: *fœtus papyraceus* (b).



FIG. 10.—Flat or platypelloid pelvis. Short antero-posterior and long transverse diameter.



FIG. 11.—Spondylolisthesis. The 5th lumbar vertebral body has slipped forwards on the sacrum. This may cause considerable narrowing of the conjugate diameter at the inlet.



On the other hand, several experiments have been done which demonstrate its efficacy; the work of Heimbeek (1929) is a typical instance.

Heimbeek found that a large proportion of his pupil nurses, who were drawn from the mountainous districts of Scandinavia, became tuberculous within a short time of beginning their hospital training. He investigated this and discovered that owing to their rural upbringing only half of them had a positive Pirquet on arrival at hospital. He analysed the two groups and found that the ultimate morbidity rate from tuberculosis with the Pirquet negative nurses was 29.6 per cent., whilst the Pirquet-positives showed a figure of only 2.6 per cent. He therefore inoculated the Pirquet-negative group with B.C.G. and turned them Pirquet-positive; within five years the morbidity rate in the B.C.G. group had dropped to 2.3 per cent.

In conclusion I would say that although no statistics can be given the mass of evidence suggests that B.C.G. inoculation does produce a definite degree of immunity to tuberculosis. My own impression is that it at least doubles the natural immunity of the average European or American child. As this means that the incidence of tuberculosis in children in this country could be halved by the introduction of B.C.G. inoculation, it is difficult to understand why twenty-five years have been allowed to elapse before its introduction has even reached the stage of being "favourably considered". I have been continually met with the answer that the present scheme for the treatment of tuberculosis should not be discarded until the efficacy of the B.C.G. vaccine is firmly established. But, as I have continually pointed out, the B.C.G. should be used not to replace, or in any way to alter, the existing scheme, but as an additional measure which can be added without causing any dislocation.

#### SCHEME FOR B.C.G. VACCINATION

In evolving any scheme for B.C.G. vaccination the following cardinal points must be borne in mind:—

(1) B.C.G. inoculation should be given only to Mantoux-negative children or to new-born babies (all of whom are Mantoux-negative).

(2) The inoculated child must be isolated from contact with tuberculosis for a minimum period of six weeks, during which time immunity is developing.

(3) The Mantoux test does not become positive until about six weeks after natural infection or B.C.G. inoculation.

The following is my suggestion for the practical application of B.C.G. in this country:—

A suspected case of tuberculosis is discovered by a general practitioner and referred at once to the tuberculosis officer for the usual investigations. If the diagnosis is confirmed by the tuberculosis officer, immediate arrangements are made for the removal of the tuberculous patient to a sanatorium or other institution for a minimum period of three months. Meanwhile, all contacts are carefully examined and any further suspicious cases are similarly investigated and, if tuberculous, similarly segregated. This leaves the re-

maining contacts who may or may not have been infected up to the moment of departure of the tuberculous patients. A minimum of six weeks must now be allowed to elapse before the contacts are again seen, so that any late infected person will have become tuberculin-positive; the tuberculosis officer then performs a Mantoux test on all the contacts and arrangements are made for the test to be read seventy-two hours later by the general practitioner or health visitor. All positive reactors should be subjected to the most rigorous inspection for evidence of early active tuberculosis; if all the results are negative it may be safely assumed that the positive Mantoux was due to a previous primary infection which has been overcome; these contacts have already developed their acquired immunity and can be discharged from the clinic.

The Mantoux-negative contacts are then given an inoculation of B.C.G. by one of the two following methods:—

*In the large clinic* "Rosenthal's multiple-puncture" (Rosenthal, 1939) is the method of choice, using Birkhaug's instrument; this is a simple apparatus which is pressed firmly on the skin and, on touching a trigger, 40 needles are released which just puncture the skin. The site chosen is the insertion of the deltoid in the left arm. For details of the technique I quote direct from Birkhaug's article:—

"The skin and lateral aspect of the arm are cleansed thoroughly with ether. A 4 x 4 cm. sterile piece of very thin tissue paper or cellophane is moistened on both sides in 20 mg. per ml. B.C.G. vaccine in a sterile Petri dish and is placed on the ether-cleansed skin. The cock on the apparatus is drawn up, the end-plate is pressed against the paper while the button is released which releases the needle-plate. Vaccination is finished and the arm is held tightly in order to stretch the skin slightly. After two minutes the vaccinated person can leave without any bandage over the vaccinated area. For mass-vaccination, we have placed a series of 20-30 papers in tile formation in the B.C.G. emulsion, leaving 1-2 mm. free edge, which facilitates lifting the paper with forceps . . . One important fact must be borne in mind with this technique, and that is that the paper must be thoroughly soaked with 20 mg. per ml. B.C.G. emulsion. One physician can easily vaccinate 200 persons per hour when the assisting nurses make the proper arrangements". (Birkhaug, 1944).

Three weeks later a small red papule will have appeared at the site of each needle inoculation; over the next few weeks these gradually retrogress and in the majority of cases eventually disappear leaving no scar. Occasionally there is some enlargement of the axillary glands, but this is not marked.

*For the small tuberculosis centre*, or for the isolated case which the general practitioner may wish to do himself, the method of Nègre and Bretey (1941), as now practised by Weill-Hallé (1939), is simpler and equally effective.

The technique for this method is to clean the same area with ether and to place on it three drops of a B.C.G. emulsion (5 mgm. per c.cm.) in a straight line down the arm about half an inch apart. With an ordinary surgical needle a line is scratched straight through the three spots, followed by a scratch at right angles through each drop of about half an inch in length in a manner very similar to one of the methods of

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smallpox vaccination. The local reaction is usually slight and takes the form of reddening and thickening of the crosses which reaches a maximum in ten to thirty days; sometimes there may be a marked reaction with raised lines almost like a keloid. The enlargement of the axillary gland is again slight or absent and six months later the marks have usually disappeared.

There is no general reaction or malaise from either of these methods and the child does not find the local condition painful.

#### KEEPING PROPERTIES OF B.C.G.

With regard to the vaccine itself, this will probably be issued in dated ampoules. As it is a live vaccine it must be used, like calf lymph, before it deteriorates; there is still some doubt about the length of time it may be stored but it is safe to say that, kept in a cool place, it will maintain its full potency for ten days. Research is being made into the freezing and drying of the B.C.G.; if it is found that it can be kept alive by this method for several months, it will be possible to check the virulence of each batch of vaccine before issue.

#### THE POST-INOCULATION PERIOD

Six weeks must now be allowed to elapse before the inoculated children are allowed to come in contact with any possible source of tuberculosis. This need not be done by the elaborate, expensive and impracticable method adopted in some countries of sending the children to special country homes, but merely by making sure that none of the tuberculous members of the family, however quiescent, returns until this time has elapsed; this is the reason for my original statement that the tuberculous members of the family must be sent to a sanatorium or institution for a minimum period of three months. At the end of the six weeks' period the inoculated children should again be Mantoux tested; should any still show a negative result they must be reinoculated, but with the technique described here this rarely occurs.

This scheme has the merit of being simple: it throws little extra work on the tuberculosis officer and general practitioner; it in no way dislocates the existing scheme; it causes no harm and little inconvenience to the inoculated. In fact it is difficult to see why the benefits of this new weapon in the fight against tuberculosis have been withheld so long from the British child.

#### References

- Birkhaug, K. (1944): *Acta Med. Scand.*, **117**, 274.  
 Heimbeck, J. (1929): *Ann. Inst. Pasteur*, **43**, 1229.  
 Irvine, K. N. (1934): "The B.C.G. Vaccine", London.  
*Lancet* (1931): **ii**, 1038.  
 Nègre, L., and Bretey, J. (1941): *Ann. Inst. Pasteur*, **67**, 161.  
 Petroff, S. (1927-8): *Proc. Soc. exp. Biol. Med.*, **N.Y.**, **25**, 14.  
 Rosenthal, S. R. (1939): *Am. Rev. Tuberc.*, **39**, 128.  
 Weill-Hallé, B. (1939): *Rev. Tuberc.*, **5**, 827.

# INFECTIONS OF THE SKIN OF THE SCALP IN CHILDHOOD

By A. GIRDWOOD FERGUSON, M.D., F.R.F.P.S.

*Assistant Dispensary Physician, Diseases of the Skin, Western Infirmary, Glasgow ;  
Assistant Visiting Physician, Diseases of the Skin, Stobhill Hospital, Glasgow ;  
Formerly Adviser in Dermatology, S.E.A.C.*

THE acutely infected conditions of the skin of the hairy scalp in children form an important part of everyday general and dermatological practice, and in spite of their frequent occurrence, little, if any, attempt has been made to deal with and differentiate them as a group. There seems to be a regrettable tendency to associate various conditions of this nature under the general heading of "infected eczema"—on the one hand an abstract and convenient designation, but on the other, one which is apt to prove vague and misleading. Although there is a striking morphological similarity in these eruptions, there appear to be certain clinical features which, if correlated with the bacteriological findings, assist in their differentiation. Further, the successful response of these scalp infections to therapeutic measures can only be determined by accurate diagnosis and careful choice of medicament.

## ETIOLOGY

The pyogenic disorders of the scalp are much more common in children than in adults, and the incidence is greater among female children. It would thus appear either that the juvenile scalp is more susceptible to the attacks of pyococci, in the same way as to those of the small-spored fungus of ringworm, or that the general standard of scalp hygiene is lower in children. The latter factor is the more likely and probably accounts primarily for the age incidence. The higher disease rate among girls can easily be explained by their greater profusion of hair, with its often very obvious attendant evils.

TABLE I

Etiological factor	No. of cases	Percentage of total
Pediculosis capitis and abrasions	37	74 per cent.
Injury .. .. .	6	12 per cent.
Cause unknown .. .. .	7	14 per cent.

In observing a series of fifty cases of scalp infection in a hospital department devoted to the treatment of skin diseases of childhood, the following additional exciting factors were noted in forty-three instances, whilst in the remaining seven no gross cause could be found (table 1).

The apparently common exciting cause was therefore a parasitic infestation of the scalp, whilst in a considerable percentage of the remaining cases

there was a history of slight injury to the skin. Pediculosis capitis provided an obvious portal of entry for pyococci through scratch abrasions, and in cases with a history of injury the portal had been the single or multiple wounds produced by the trauma. In the group of patients without any reliable history, an eruption of considerable morphological interest which tended to bear out the comparatively vague story of etiology was found in every case.

In the groups associated with parasitic infestations or with injury, similar exciting factors and resulting eruptions were noted. The exact type of eruption produced appeared to depend upon two further points in etiology, namely, (1) the particular organism or organisms inoculated through the abraded skin, and (2) the state of the sebaceous mechanism of the scalp.

The organisms concerned were studied and were found to be the *Streptococcus pyogenes* (hæmolytic and non-hæmolytic), *Staphylococcus pyogenes aureus* (non-hæmolytic) and *Staphylococcus albus*, whilst in the presence of abnormal dryness or greasiness of the scalp the so-called "seborrhæic" organisms (*Pityrosporon* of Malassez and *Staphylococcus epidermidis albus*) were also found in considerable numbers. The remaining group of apparently idiopathic cases yielded no pathogens on bacteriological study of material from the lesions, but in four of the seven cases evidence of a previous infection of the accessory nasal sinuses was discovered. No organisms were, however, isolated from washings.

#### SYMPTOMATOLOGY

In the first two etiological groups the eruptions were of the following types:—

(1) An initially vesicular and subsequently crusted process, the crusts being honey-coloured and the lesions irregular in size and shape and of

discrete character. The eruption was clinically one of impetigo contagiosa. Cultures from the lesions yielded heavy growths of streptococci and staphylococci [27 cases] (fig. 1).

(2) An eruption composed of small folli-



FIG. 1.—Impetigo contagiosa.



FIG. 2.—Folliculitis.

cular pustules, each pierced by an individual hair, the lesions being discrete

and of similar size throughout. Cultures gave a pure growth of *Staphylococcus aureus*, and the condition was a simple folliculitis [10 cases] (fig. 2).

(3) A confluent, œdematous, papulo-pustular eczematous eruption with much superimposed yellow crusting and scaling, cultures from which gave a mixed growth of pyogenic and seborrhœic organisms. This condition was almost invariably present in cases in which there was a clear history of previous disorder of the sebaceous glands of the scalp, as denoted by the presence of "dandruff". It conformed clinically to the condition known as seborrhœic eczema, and appeared to be an infectious eczematoid dermatitis occurring in an individual possessing a disordered sebaceous scalp mechanism [6 cases] (fig. 3).



FIG 3 —Infectious eczematoid dermatitis.

every instance the eruption was made up of small vesicular pustules arranged in widely scattered groups upon livid or erythematous bases. The lesions were very superficially set in the skin and apparently were unrelated to the hair follicles. The condition seemed to be an example of that known as pustular eczema. The contents of the pustules were found in all instances to be sterile [table 2] (fig. 4).

It was noted that in association with several of the scalp affections described above there appeared elsewhere on the bodies of the patients eczematous eruptions, which were thought to be allergic reactions due to circulation in the blood and lymph streams of toxic substances derived from the organisms present in the main foci. Thus, in association with folliculitis, and occasionally with impetigo of the scalp, it was noted that an eruption beginning as a mild erythema, passing through a papulo-vesicular stage, and finally becoming patchily lichenified due to scratching, was occasionally (2 per cent. of cases) present on the skin of the nape of the neck, acromial and deltoid regions, sacral area and abdomen. Associated with the type of scalp eruption described above as infectious eczematoid dermatitis, in three of the six cases an acute secondarily infected and eczematized process of similar appearance to the original focus was noted, involving the posterior



FIG 4 —Pustular eczema



auricular, axillary and groin folds. The inference drawn from these findings was that the secondary eruption on remote areas was in the first instance due

TABLE 2

Etiological factor	No. of cases	Organisms found	Disease
Pediculosis capitis and abrasions, or injury	27	Streptococci and Staphylococci	Impetigo
	10	Staphylococci	Folliculitis
	6	Streptococci, Staphylococci and Seborrhæic organisms	Infectious eczematoid dermatitis
Cause unknown ..	7	Sterile	Pustular eczema

to sensitization of the skin by toxic products elaborated by staphylococci and probably streptococci, and in the second that in addition there was a superimposed infection from without by seborrhæic organisms. Patients presenting the eczematoid type of scalp eruption were subjects of the seborrhæic diathesis.

The patients with pustular scalp eczema were thought to have developed a *primary* allergic eruption, the allergen being elaborated in a focus of endogenous and not exogenous nature. In this connexion it is of interest to recall the fact that in four of the seven cases there was evidence of old antral infection.

#### TREATMENT

Despite the present use of the sulphonamides and penicillin in the treatment of many localized infective conditions of the skin in adults, it is my experience that the older methods of therapy, which have been well described by Adamson (1907) in his excellent manual on the skin affections of childhood, still hold good in the treatment of children.

*Impetigo* responds well to frequent applications of 0.5 per cent. sulphur in calamine lotion, for three or four days, after which removal of the inspissated crusts is followed by the use once daily of a 1 per cent. ammoniated mercury paste or ointment. The hair should be cut short over the affected parts before treatment is started. Properly carried out, and with concomitant treatment of any underlying parasitic cause, cure can be expected in just over a week with this form of therapy, even in the most severe cases.

*Follicular infections* do well on applications of 1 per cent. each of malachite green and corrosive sublimate in spirit as a paint, twice daily. In resistant cases, forceps epilation of hairs from infected follicles usually eradicates remaining foci. It is rarely necessary to resort to more drastic methods of epilation.

*Infected eczematous eruptions* usually require cropping of the hair and

initial four-hourly boracic acid fomentations, followed after twenty-four to thirty-six hours by moist applications of the following liniment on dressing cloth, changed night and morning:—

R Ichthyol .....	120 grains (8 gm.)
Calamine .....	180 grains (12 gm.)
Linseed oil .....	
Lime water .....	āā 4 ounces (113.6 c.cm.)

Should the condition enter a chronic phase, a most useful form of treatment is the application of crude gasworks tar as a paint, twice weekly. If such therapy is used, a careful watch must be kept upon the urine, as renal irritation due to absorption is a possible side-effect.

The cases labelled pustular eczema are in general the most resistant to treatment. A careful search for endogenous foci of infection and eradication of these if found usually repay the trouble taken. Locally, an astringent application, such as 1 per cent. or 2 per cent. silver nitrate in spirit of nitrous ether, twice daily, often proves useful. Another useful local medicament is the so-called Ruggle's mixture of the American school of clinicians. This consists of salicylic acid 2 parts, tannic acid 10 parts, and alcohol to 100 parts, and is applied once or twice daily as a moist dressing. In the healing stages, a daily application of Lassar's paste, containing 1 per cent. of salicylic acid, will hasten a normal epithelial regeneration.

### CONCLUSIONS

Acute and infected eruptions occurring on the scalps of children seem commonly to take one of four distinct forms.

Most cases are of staphylococcal and streptococcal origin, predisposing factors being animal parasitic infestation and minor trauma. The eruptions are mostly impetiginous, but may be of the nature of folliculitis or infectious eczematoid dermatitis.

A smaller group of patients presents an allergic eczematide which is localized on the scalp, the allergen being in all probability derived from an endogenous focus of infection.

### SUMMARY

The etiology and symptomatology of the acute infections of the skin of the scalp in children are discussed and appropriate lines of treatment indicated. The article is based on observations carried out upon a series of fifty cases seen in a ward devoted to the treatment of skin diseases of childhood.

My thanks are due to Dr. A. D. McLachlan for many helpful comments on the preparation of this short article, and also to Dr. A. D. Briggs, Medical Superintendent, Stobhill Hospital, Glasgow, for permission to carry out investigations in the Dermatological Department of the hospital.

### Reference

Adamson, H. G. (1907): "The Skin Affections of Childhood," London.

# PAIN AND ITS PROBLEMS

## VII.—PAIN IN THE RHEUMATIC DISEASES

By G. D. KERSLEY, M.D., F.R.C.P.

*Physician, Royal National Hospital for Rheumatic Diseases, and Royal United and Orthopaedic Hospitals, Bath, and to the British Red Cross Clinic for Rheumatism, London.*

A NUMBER of facts, which are applicable to the study of the causation of pain in "rheumatism" have come to light as the result of recent work, but before going into the mechanism and treatment of this pain, let us consider what we mean by the term "chronic rheumatism".

Rheumatism may be defined as pain of unknown etiology, apparently arising in the mesodermal tissues of the body. If this definition be accepted, it naturally follows that the elucidation of the problem of chronic rheumatism depends first upon a narrowing of the field of the disease; a peeling off of layers of husk before the kernel can be cracked; the elimination of syndromes previously classed as rheumatic as their etiology becomes ascertained and, lastly, an assault on the remaining homogenous nucleus, if such a nucleus exists—it is possible that all the rheumatic syndromes may have some common factor, even when there is also a specific etiological factor, such as a gonococcal infection.

### THE ORIGIN OF PAIN

Pain may be entirely physical or "organic" in causation or largely due to psychiatric causes. It is defined in the Oxford Dictionary as "a sensation one feels when hurt in body or mind". Hilton, in 1863, gave as the purpose of pain the need for rest for the injured part—Nature's method of splinting a joint. In the psychological field it serves a similar purpose for the mind injured by conflict.

No satisfactory method of measuring pain has yet been discovered and it is extraordinary how, for instance, in gonococcal arthritis, a joint may be red, hot and very swollen with apparently little pain, yet another may cause exquisite anguish with but little in the way of physical signs—even in the same patient the pain may not correspond with the outward indications. Valuable work has, however, been carried out by Kellgren (1939) on the type of pain occasioned by stimulation of different structures. By injection of a 6 per cent. saline solution, he found that pain from the superficial structures was accurately localized in proportion to its superficiality and this was the case whether it were the subcutaneous tissues, superficial ligaments, or tendons, fascia or even the subcutaneous periosteum of the tibia that was injected. A stimulus of short duration was described as pricking and the same stimulus continued gave a burning sensation (Lewis, 1942). When, however, the injection was made at a depth, for instance into

the interspinous ligaments or deep muscles, the pain became diffuse, aching in character and referred approximately, but not accurately, in a segmental distribution. It was often accompanied by muscular spasm and tenderness in the area of reference and it could reproduce exactly pain of visceral origin. Injection of the interspinous ligaments at the level of the 8th cervical vertebra produced a "cardiac" pain and at the 1st lumbar level the pain of renal colic.

Davies (1945) found that the synovial membrane was insensitive to pressure and touch, but that tension was appreciated as a poorly localized aching, whilst a stab with a needle produced a sharp pain, again localized with difficulty only to the side of the joint so stimulated.

### JOINT PAIN

Pain in and around the joints may be grouped into three types, although of course more than one may be present at the same time.

(a) "Bone" pain, boring in character, worse at night, similar to the pain experienced in neoplasm or sepsis of bone. This is found in a small percentage of osteoarthritic hips and is very resistant to treatment. It will, however, often yield to surgery, including bone drilling or forage.

(b) The continuous pain experienced in active arthritis, a useful criterion of the activity of rheumatoid arthritis.

(c) Pain on movement found in nearly all cases of arthritis and also in periarticular fibrositis.

**TREATMENT.**—Certain principles may be applied to the relief of joint pain, whatever its causation and situation. Any inflamed joint should be *rested* as completely as possible and this usually means splintage: for the ankles and knees, split plasters from the upper third of the thigh to the toes are required; for the hands, moulded slab plasters for the night and wrist plasters during the day; and for the shoulders, slings and springs. When plasters are worn, they are removed for daily non-weight bearing exercises, preferably in a warm pool or in slings in a warm gymnasium.

*Heat* is most comforting, especially perhaps in the form of mud packs or, for the hands and feet, wax baths. Infra-red and radiant heat are also helpful and short wave diathermy is used for the deeper joints, such as the hips. In some cases cold compresses or alternating heat and cold give the most relief.

*Counter-irritation* with cantharides, perhaps incorporated in some kaolin poultice in 5 per cent. concentration, mustard, Scott's dressing, an erythema dose of ultra-violet light, histamine ionization, anodal galvanism, and finally, most valuable but now seldom used, the application of the dull red wire of the cautery.

When pain and tenderness is localized mainly to one side of a joint, an *injection of novutox* sometimes produces a dramatic result.

*X-ray therapy*, in four to six doses spread over about three weeks, is

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differential diagnosis. In acute rheumatism the pain is usually relieved by salicylates *if given in sufficient dosage*, in gout by colchicum, and in gonococcal arthritis by penicillin and the sulphonamides, although the effect in this condition is perhaps a little less constant.

#### PAIN IN NON-ARTICULAR RHEUMATISM

Of recent years there has been much discussion on the etiology and morbid anatomy of *fibrositis*. The inflammatory theory of Stockman (1920) has not been substantiated. Some go so far as to say that fibrositis does not exist—biopsy examinations show either lumps of fat or normal muscle (Kersley Gibson and Desmarais, 1946). There are two main theories now current: that of increased tension in fatty lobules and that of localized muscle spasm. The first theory was put forward by Copeman and Ackerman (1944) as the result of their observations on the similar location of the trigger points of fibrositic pain, first described by Kellgren (1939), and the basic fat pattern they found in cachectic subjects. This basic fat, which did not disappear on emaciation, was situated mainly in four areas—in the supraspinous fossa, along the posterior border of the scapula, along the border of the lumbo-sacral muscles and extending from the region of the sacro-iliac joints along the crests of the ilium. They found that in these areas pain and tenderness often appeared during fevers and after trauma and that this tenderness later disappeared, but was easily reactivated by minor trauma or infection. They found at these tender sites œdematous lobules of fat sometimes strangulated or herniated through fascial coverings.

Elliott (1944), using an electromyograph, showed that tender areas in muscle had continuous discharge of reaction potentials very similar to that obtained with a minimal voluntary contraction. He postulated the theory that such tender trigger points might be due to any central irritation, such as a protruding intervertebral disc. The condition could be cured by injection of a local anæsthetic. This spasm may account for those "nodules" which disappear during the process of biopsy.

Whether one or both of these theories be right, there is no doubt that in many cases of so-called acute fibrositis two types of area of tenderness are discoverable, one diffuse and corresponding with the site of pain and one smaller, only to be found on careful deep palpation and usually at a slightly higher level and nearer the spine. If the latter is anæsthetized the pain and tenderness in the diffuse area also disappears. The injection of 5 to 10 c.cm. of novutox should be followed by deep friction and then mobilizing exercises. A few hours later there is usually some return of the pain, which then gradually disappears. Whether the injection relieves localized muscle spasm or breaks down the capsule of a fatty lobule is, however, still a matter of conjecture.

When a "neuritic" pain exists—in *sciatica* and *brachial neuritis*—the differential diagnosis is often far from easy. Having excluded the usual

often a useful method of treatment to fall back upon. The benefit of the treatment, however, is often not felt until some weeks later.

*Analgesics* must not be neglected. The old mixture of aspirin, 10 grains (0.65 gm), phenacetin, 5 grains (0.32 gm.), and caffeine, 1 grain (0.065 gm.), is a good and safe stand-by. To this may be added half a grain (32 mgm.) of pethidine, 1 grain (65 mgm.) of codeine or 1/6 grain (11 mgm.) of heroin, if necessary. For the night dose, 1 grain (65 mgm.) of phenobarbitone may take the place of the caffeine. For those who cannot take aspirin, anti-kamnia and codeine or pethidine are often useful.

In *rheumatoid arthritis* the morbid process affects all the mesodermal tissues of the body and the treatment must be planned largely on general lines, although later, when the activity has decreased and becomes localized to a few joints, X-ray treatment is very helpful. The absence of rest pain, together with gain in weight and improvement in the sedimentation rate and anæmia are the most valuable criteria of decreasing activity. Analgesics are of great importance, as not only are they called for on grounds of humanitarianism but, by allowing the patient to sleep and eat, are in some cases of curative value.

In *osteoarthritis* of the hands, when there is discomfort, mud packs followed by contrast bathing or douching, beginning and finishing with heat, are helpful. For monarticular arthritis, saving the joint is the most important factor in treatment, but lately lactic acid and procaine injections have been much vaunted. They do seem to ease pain in some cases, but do not increase range of movement. Controlled work on their value is proceeding at the moment. In some cases, surgery is the only answer—osteotomy, arthrodesis or arthroplasty, according to the age of the patient, his occupation, and the freedom from disease of the other joints in the neighbourhood. It should be remembered that one painless stiff joint is very little handicap to any man. X-ray therapy helps in some cases.

In *spondylitis ankylopoetica* conservancy of reasonable posture by means of a plaster bed and a brace, coupled with breathing exercises and X-ray therapy is the answer. The latter seems to have some specific as well as analgesic effect in this condition. It must be remembered that no brace can adequately support the back, but it will act as a check and warn the patient that he must take more rest or return to hospital for further treatment.

The pain in *gout* is controlled in the majority of cases by colchicum, provided that the dosage is pushed to the production of slight diarrhoea or nausea; this may require colchicine, 1/120 grain (0.54 mgm.), five to eight times in the day. When the maximum tolerated dose has been ascertained, this is given together with aspirin for several weeks and the dose then gradually reduced. Meanwhile, the affected joint should be rested, while heat or cold is applied, with the addition later of contrast douching.

*Acute arthritis* in adults is commonly due to acute rheumatism, gout or gonorrhœa, and the therapeutic test is particularly valuable in the

predominant, whilst Flind and Barber (1945) assessed 42 per cent. of cases under treatment in a chronic rheumatism unit of an R.A.F. hospital as being in this category. They stated that 35 per cent. were definitely abnormal psychologically, whereas only 3 per cent. of a control group of non-rheumatic cases were comparable in this respect. In determining the importance of physical *versus* psychological factors, the presence or absence of physical signs, the constancy of symptoms and, if present, of the points of tenderness, the type of patient and the way he describes his pain, and finally, the presence of an incentive or reason for development of symptoms, are all of value. The correct assessment cannot, however, be learnt from books, but only by practice and often by something akin to "intuition", if one may be so unscientific as to use the word. Those cases with a good psychological background react well to combined physical and psychological treatment, but the remainder are indeed a problem.

### References

- Copeman, W. S. C., and Ackerman, W. L. (1944): *Quart. J. Med.*, 13, 37.  
Davies, D. V. (1945): *Ann. Rheum. Dis.*, 5, 29.  
Elliott, F. A. (1944): *Lancet*, i, 47.  
Fletcher, E. (1947): "Diseases of the Locomotive System," Edinburgh.  
Flind, J., and Barber, H. S. (1945): *Quart. J. Med.*, 14, 57.  
Halliday, J. L. (1937): *Brit. med. J.*, i, 213.  
Kellgren, L. H. (1939): *J. Clin. Sci.*, 4, 35.  
— (1941): *Lancet*, i, 561.  
Kersley, G. D., Gibson, H. J., and Desmarais, M. H. L. (1946): *Ann. Rheum. Dis.*, 5, 141.  
Lewis, T. (1942): "Pain," New York.  
Stockman, R. (1920): "Rheumatism and Arthritis," Edinburgh.



textbook differential diagnoses—neoplasm, vertebral bone disease—by means of a full clinical examination and X-ray examination, the conditions for consideration are (a) a true virus neuritis, which will eventually leave one or two muscles paralysed, e.g., a winged scapula; (b) a root pain, the most common cause of which is a protrusion of an intervertebral disc; and (c) a referred pain from a "fibrositic" focus, such as can sometimes be cured by novocaine injection.

It is impossible to assess the true prevalence of intervertebral discs as a cause of brachial neuritis and sciatica. Some orthopædists claim that 95 per cent. are due to this factor. Kellgren (1941), however, found discs as the cause of sciatica in 15 out of 70 cases: 5 others were due to definite neurological lesions. There is no definite symptom or sign that will give a clear-cut answer to the question, "Is this a disc or root lesion?" Root pains are apt, in the early stages, to be periodic, later becoming continuous with exacerbation on performing certain movements and on jarring and coughing. The pain is a deep ache and boring or stabbing in character. If due to a cervical disc protrusion, it is usually only the 7th cervical root that is compressed and, most muscles being supplied by more than one root, there is usually no wasting, although the index finger may show some sensory loss. In the lumbar region, however, the disc between the 5th lumbar and 1st sacral vertebra may press on lumbar 5 and sacral 1 and 2 roots, with consequently more signs of muscle atrophy. Whatever the percentage of disc lesions may be, there is no doubt that the vast majority are cured symptomatically by rest, superficial heat and counter-irritation, rest being the main essential. Deep heat, such as short wave therapy, often makes the pain worse during the acute phase. Rest in bed and a hot pack of antiphlogistine with 5 per cent. cantharides is the best method of starting treatment. In some chronic cases relief is obtained by a combined manipulation of the back together with an epidural injection, but if this fails the application of a plaster spica to include part of the thigh of the affected side is by far the most likely method of producing a cure. The patient can get about, with a little difficulty, and when the plaster is removed in six weeks the pain is usually gone and gentle extensor and back mobilizing exercises are then begun.

#### PSYCHOSOMATIC RHEUMATISM

If it is difficult to differentiate "fibrositic" pain from other forms, it is still more difficult to assess the prevalence and importance of psychological factors in the cause of such pain. In many cases a pain due originally to an organic cause is perpetuated by the "psyche" and in many others the discomforts of physical disease are exaggerated by subconscious turmoil, as distinct from conscious malingering. Halliday (1937) found that in 39 per cent. of 145 cases of non-articular rheumatism the psychological factor was

hawked. Here fountain-pens and fruit knives are given away by cheapjacks. Here auction sales abound, at which furs, carpets, linen and diamond rings are disposed of by gentlemen so persuasive that the visitor is torn between the desire to listen and the fear that his sales resistance may be overwhelmed. On the Board Walk too are seafood restaurants, one with a seating capacity for 3000, that provide every form of soft or shell fish, but specialize in lobsters.

All the resources of Atlantic City were required to cater for the Centenary Meeting of the American Medical Association, which was attended by 15,000 American doctors, and by visitors from nearly every country in the world who had come to do homage to the presiding body of American Medicine. In addition to the general scientific meetings held on the first two days in the great ballroom of the Convention Building, there were seventeen sections at which seven or eight hundred papers were read and discussed; there were nearly 300 scientific exhibits by hospitals, clinics or individuals, technical exhibits by about 300 commercial firms, and a display of paintings and sculpture by medical artists.

The American Medical Association was founded in 1847. For a hundred years it has worked to unify the profession, to establish and raise ethical standards in practice, and to improve public health. To-day it stands an honoured centenarian, numbering 130,000 of America's 190,000 doctors in its ranks. Prominent among its activities is the *Journal of the American Medical Association*, which has been fostered, guided, and managed for thirty-five years by that fine fighter Dr. Morris Fishbein.

The outstanding event of the Atlantic City Convention was the general meeting of the Association, at which Dr. Edward L. Bortz of Philadelphia was inducted as President by his predecessor, Dr. H. H. Shoulders, of Nashville, Tennessee. The meeting was held in the Assembly Hall and music was provided by the Philadelphia Festival Orchestra. Foreign guests, prominent among whom were Dr. Guy Dain, Dr. Charles Hill, Dr. Hugh Clegg and Dr. John Pridham representing the British Medical Association, were introduced to the Assembly and at the close of the meeting were awarded the Honorary Fellowship of the Association.

#### PAPERS AND DISCUSSIONS

The papers read before the sections covered the whole ground of medical science and practice. In most sections a Centennial address was given and in most an opening paper was read by an invited representative from abroad: Professor George W. Pickering of Saint Mary's Hospital, Professor H. J. Seddon and Professor Howard Florey of Oxford, Sir Heneage Ogilvie, Sir Steward Duke Elder, Mr. Ewart Martin, Mr. Terence Millin, Dr. A. R. Hunter, and Dr. E. Ashworth Underwood, were the British contributors.

The keynote of the whole convention was the practical outlook evinced in the papers, demonstrations and exhibits. All but the formal addresses were discussed, first by one or two picked speakers, then by members of the audience. A prominent feature was the number of panel discussions or symposia. There was, for instance, a notable discussion on peptic ulcer by

# THE CENTENARY MEETING OF THE AMERICAN MEDICAL ASSOCIATION

ATLANTIC CITY, JUNE 9-13, 1947.

THE convention habit is a manifestation of the social qualities of the great American people. Other nations have their meetings, rallies, assemblies, congresses, at which those with a common interest meet to exchange views; but whereas in other countries these meetings are sporadic and deal with tens or hundreds, in America they are continuous and are concerned with thousands. The British doctor on instruction bent has offered to him in twelve months the annual meeting of the B.M.A. and, if he is a specialist, the meeting of the Association devoted to his branch of practice, but little else beyond the gatherings of small local societies. The American doctor on any day of the year has the choice of several conventions taking place simultaneously in different cities of his far-flung and thickly populated continent. He keeps through life a thirst for information, not merely in his own subject but in every branch of learning, and he works at his job with a concentrated intensity that would inevitably lead to breakdown if he did not interpose periods of relaxation. He seeks in the convention both rest and instruction. In a beautiful town, staying in a comfortable hotel, surrounded by friends whom he has not met since the last convention, he can for a few days cast aside the cares of practice, and find at the same time food for the mind and relaxation or healthy exercise for the body.

Atlantic City is a typical convention town. Situated on the New Jersey Coast about a hundred miles from New York, it has been built to house the maximum number of visitors in the greatest comfort. Centrally stands a large Convention Building, with a main hall offering perhaps 100,000 square feet of floor space, a huge auditorium equipped with every device to aid sight and sound, and many smaller rooms. Grouped round this building on the sea front are sixteen major hotels, each containing a large hall to seat 1000 or more, with galleries and platform, that can be used for functions of any kind, and half a dozen smaller halls for receptions or section meetings. Each hotel has a convention secretary, whose business it is to arrange all the details of registration, entertainment, lectures, banquets, and the many functions that make up this constant succession of conventions. Behind the sea front are thirty or forty smaller hotels. Along the beach runs the Board Walk, Atlantic City's most typical feature; a promenade of small planks laid in herringbone pattern that extends for five miles.

Up and down the Board Walk passes a procession of open wickerwork chariots seating three abreast, and pushed from behind by a coloured gentleman who has devoted his life to this one avocation. Lining the whole five miles, and broken only by the entrances to the hotels which lie behind them, are shops and booths in which every ware that may attract the holiday maker or conventioner is displayed or

of Tulane University. The surgical management of hyperhidrosis demonstrated by Dr. J. Ross Veal of Georgetown University, an exhibit remarkable for the effective use of the strip cartoon to illustrate clinical histories. Lester P. Dragstedt and his colleagues from the University of Chicago illustrated the physiological basis for their great contribution to gastric surgery—vagal section in the treatment of peptic ulcer. Dr. Meyer Cantor from Detroit displayed a new single-lumen mercury-lead intestinal decompression tube; he had on his stand a life-size plaster model with œsophagus, stomach and intestine made of glass, through which the passage of the tube by the aid of gravity alone could be demonstrated. Champ Lyons of Tulane University, whose work on the biochemical assessment of the seriously wounded during the war is well known, discussed the problem of reduced blood volume in the chronically ill patient. A group from Wayne University College, Detroit, demonstrated a method of investigating the mechanics of production of skull fractures by means of strain-sensitive lacquer. The Baltimore Rh typing laboratory presented studies in Rh immunization in pregnancy. Dr. Julius Lempert, the originator of the fenestration operation for otosclerotic deafness, demonstrated the rationale and technique of his operation by photomicrographs, pathological specimens, and a series of cadaver dissections which made plain every detail of this extremely intricate operation; and nearby, one of his pupils, Dr. Brown Farrior of New Orleans, showed on coloured preparations of temporal bones every type of operation on the auditory apparatus, including grafting and re-routing of the facial nerve. Gordon New and others from the Laryngological Department of the Mayo Clinic had an exhibition of the operations for cancer of the larynx, illustrated by lifelike models in wax. Max Strumia showed a method for embedding human tissues in natural colour in transparent plastic. A group from the U.S. Marine Hospital at Carville, Louisiana, staged a most impressive demonstration of the improvement brought about by modern chemotherapeutic agents in every type of leprosy, including advanced cases. James Dickson of the Cleveland Clinic illustrated his operation of geometric osteotomy for ununited fracture of the neck of the femur in which by a cut shaped to the angles of a hexagon he abducts the shaft  $60^{\circ}$  on the upper end.

The Technical Section included exhibits by nearly 300 firms specializing in every requisite for medical practice or medical education. In this section the acquisitive doctor was loaded with gifts—free cigarettes for himself and cosmetics for his wife, free dressings, strappings or drugs for his patients, and, when he felt weary with absorbing information, free pineapple juice or unlimited free drinks of iced coca-cola handed to him by sweet young ladies in Victorian dress.

It is strange to think that a London doctor can breakfast in Britain in the small hours of Sunday, sup in New York, arrive at Atlantic Convention City for lunch on Monday, and breakfast again in London the following Monday, bearing with him the memories of his wonderful week: memories of a great Association that has worked for a hundred years to better the health of the American people and the standing and scientific training of the American doctor; memories of an educational feast without parallel even in this land of medical conventions; above all memories of a progressive and great-hearted people whose generosity, public and individual, knows no bounds.

*The Practitioner* wishes the American Medical Association all prosperity as it enters its second century under such happy auspices. The Editors hope, during the coming year, to publish a series of articles from American correspondents, outlining the trends of various branches of practice in the United States.

the combined sections on Surgery and Gastro-enterology at which nine papers covering all aspects of the problem were read and discussed. There were similar discussions and grouped papers on recent advances in treatment, on virus diseases, cancer research, liver disease, pancreatic disease, ulcerative colitis, on "what you can do for the hard of hearing", on gastritis and gastric neoplasms, physical medicine, and the problems of general practice. The concept of the open forum was carried further in the organization by the section on Internal Medicine of "Question and Answer Conferences" on cardiovascular diseases and on diabetes. Each of these conferences had a room allotted to it in the Convention Hall, in which various aspects of the subject were discussed in turn throughout the week. In the cardiovascular conference a half day was allotted to each subject.

### SCIENTIFIC EXHIBITS

The Scientific Exhibits, which form so prominent a feature of any American Medical Convention, strike the British visitor who meets them for the first time with a feeling of wonder which, however, soon gives way to approval, not necessarily accompanied by agreement that the feature is one transplantable to British soil.

The exhibitors take stands of from six to twenty feet in width in which they set out, by all methods of visual presentation, some particular thesis. The individual practitioner may have a single exhibit with diagrams, photographs, pathological specimens or enlarged microphotographs, where he stands, helped perhaps by one or two nurses and relieved from time to time by an assistant, handing out reprints, discussing difficulties with interested visitors, ready to explain what the exhibit is about. The clinic will usually stage a larger exhibit, often supplemented by a continuous cinematographic demonstration in an adjoining room. Every exhibitor must before acceptance submit his proposed demonstration to a committee of the board of trustees, who scan the ethical standing of the applicant, the originality and importance of his work, and the educative value of the exhibit.

Features that must be emphasized are the skill with which elaborate statistics are reduced to a form that can be rapidly grasped by means of graphs or diagrams, the high development of the cartoon and the simplified anatomical figure, the use of dissections, coloured and illuminated, to illustrate in detail the successive steps of a new operation, and the high perfection to which the making of coloured wax models has been brought. Two excellent demonstrations by the Mayo Clinic on the pathology and surgical treatment of certain intrathoracic lesions, and on congenital anomalies of the heart and great vessels, were rendered admirably clear by the liberal use of such models.

In addition to these, a few outstanding exhibits may be mentioned in the order in which they were encountered round the Hall: A special exhibit on fractures, organized by a committee of orthopaedic surgeons, in which was staged a continuous demonstration of the methods of fixation recommended in the common fractures of the extremities and spine. The investigation of the mechanism of congestive heart failure by means of radio-active sodium explained by representatives

## THE TREATMENT OF *TRICHOMONAS VAGINALIS* INFESTATION

INFESTATION with this parasite is very common, but the origin of the parasite and its mode of transmission are still in doubt and disputed. *Trichomonas vaginalis* is found in about 30 per cent. of women attending venereal disease departments and in about 20 per cent. of gynaecological out-patients. It is found most frequently during active sexual life, but clinical manifestations may arise in virgins and after the menopause. The symptoms and signs are usually most marked just before or for forty-eight hours after a menstrual period, or during pregnancy. The only symptoms are vaginal discharge and irritation of the vulva.

The normal adult vagina contains *Döderlein's bacillus* which depends for existence upon the presence of glycogen in the vaginal epithelium, and which produces a strongly acid reaction (pH 4-5) in the vagina. This acid reaction inhibits pathogenic organisms and saprophytes. During the menstrual period, the alkaline flow of blood from the uterus and cervix neutralizes the acid and permits *Tr. vaginalis* and other organisms to multiply in the vagina.

*Tr. vaginalis* may be found in males, especially in the uncircumcised if they are unclean, and it flourishes in the coronal sulcus and causes balanitis. It may also invade the male urethra, causing subacute urethritis and occasionally prostatitis.

### CLINICAL DIAGNOSIS

In women with acute *Tr. vaginalis* infestation the vulva is reddened and itches. The vagina appears inflamed and "sodden", and contains a copious yellowish frothy discharge with a characteristic odour, which is not stinking but slightly "fishy". The vaginal portion of the cervix is often eroded, but only very superficial ulceration occurs, which is not painful and does not bleed readily when the discharge is mopped away. The external os and the cervical canal are not affected to a noticeable extent unless there is coincident disease (e.g., syphilis, gonorrhœa or chronic infection after child-birth). The clinical appearance is almost diagnostic, but it is wise to confirm the diagnosis by demonstration of the parasite.

A sterile speculum without any antiseptic or lubricant is introduced, and a drop of the muco-pus lying in the posterior fornix of the vagina is collected with a wire loop or spoon. It is better not to use a swab; the pus may be taken from the speculum after it is withdrawn. This is transferred to a clean slide, and one drop of pus is mixed with two drops of normal saline to which a small amount (e.g., 0.2 per cent.) of safranin has been added. The mixture is covered with a cover slip and examined with the 1/6 lens of a microscope. The parasites are seen as actively motile bodies of the same size and shape as epithelial cells. Stained preparations are not so satisfactory, and dark field preparations are much more difficult and laborious to examine.

In males the subpreputial secretion may be examined in the same way as vaginal discharge, but urine should be centrifuged immediately it is passed and the deposit examined without delay.

### TREATMENT

In women the classical remedy is *acetasone* which is prepared conveniently as acetarsone vaginal compound, two pessaries being inserted by the patient every night for several weeks. As commonly used this is only moderately successful, but I believe this is mainly due to faulty technique. The patient should be instructed to wash the hands and the vulva and perineum, then to insert the pessaries as high as possible in the vagina while she is recumbent, and finally to apply to the vulva and perineum a dusting powder containing 30 per cent. acetarsone. This external powdering is repeated twice daily. She should continue to use the pessaries and powder even in the absence of symptoms and signs until forty-eight hours after the next menstrual period, or if she is not menstruating treatment should be continued for four weeks. She should not douche during the treatment, and the pessaries are used during the menstrual period; an external sanitary pad should be used and not

# REVISION CORNER

## CONTENTS OF OBSTETRIC BAG FOR USE BY A GENERAL PRACTITIONER

For a delivery in the home a commodious obstetric bag is necessary. Its contents should include:—

### (1) *General articles:—*

Face masks; if a Cestra type is not available then paper or cellophane should be placed between the layers of gauze so as to cover completely the mouth and nose.

White cap

Mackintosh apron (light)

Rubber gloves (2 pairs)

Nail brush and germicidal soap (mercuric iodide—Neko)

Headlamp, torch

Lithotomy crutch; pelvimeter; blood-pressure apparatus

Tape measure

### (2) *Antiseptics:—*

Lysol, surgical spirit, Dettol solution and cream (30 per cent.), bichloride of mercury tablets.

### (3) *Anæsthetics:—*

Trilene (with inhaler), chloroform (with Junker apparatus). Novocaine 1 per cent. in ampoules, or novutox for local anæsthesia. Anæsthetic drop bottle, face mask, mouth gag, tongue clip, airway.

### (4) *Drugs for maternal use:—*

Ampoules of pitocin, ergometrine, omnopon and scopolamine, pethidine, atropine, methedrine. Soneryl or other barbiturate tablets.

Sulphonamide tablets and powder. Penicillin.

### (5) *For the baby:—*

Fœtal heart stethoscope, mucus catheter (Queen Charlotte's hospital pattern), CO<sub>2</sub> sparklet apparatus and face mask, small tongue clip, thread or umbilical cord tape, protargol eye drops (5 per cent.) or ampoules of silver nitrate (1 per cent.), coramine, lobeline and vitamin K ampoules.

### (6) *Instruments:—*

Sterilizer. Catheter: 1 rubber, 1 metal, 1 Drew-Smythe

Sponge holding forceps (4)

Towel clips (4)

Scissors (1 long, 1 short)

Artery forceps (2 long, 4 short)

Volsellum

Curved uterine packing forceps

Dissecting forceps (1 toothed and 1 non-toothed)

Needle holder

Needles (large and medium curved cutting, round-bodied)

Catgut (no. 0 and no. 1)

Silkworm or nylon sutures

Obstetric forceps—Haug Ferguson with traction handle, Wrigley's

Vaginal speculum—Sims. Preferably a "coldite" vaginal speculum (with battery)

Glass syringes—2 (1 c.cm.) with hypodermic needles; 1 (5 c.cm.) with long needle for local anæsthesia

Intravenous set and flask of sterile glucose solution

It should be possible to have available a drum containing a sterile gown, towels, leggings, gauze, and so on.

PROFESSOR W. C. W. NIXON, M.D., F.R.C.S., F.R.C.O.G.

*Urticaria*.—Intense irritation may precede the appearance of the wheals, but as the latter are soon seen, the diagnosis is rarely in doubt.

*Scabies*.—Although they may be continually scratching, many patients are curiously unaware of the rash. The typical runs and burrows may be found between the fingers and toes, at the wrists, round the umbilicus, or on the penis. Final proof will be getting one of the parasites out with a needle and examining it under a microscope. If the condition is long-standing and the scratch marks are infected, or if there is a secondary dermatitis, diagnosis is more difficult, but the distribution of the lesions and the history of the irritation on getting warm, for example in bed at night, are characteristic, and finding the parasite will again clinch the diagnosis.

*Pediculus corporis*, which is general, *capitis* or *pubis*, which are localized, are easy to recognize by finding the lice in the appropriate areas: the seams of the clothing should be examined for eggs and for parasites.

*Pityriasis rosea* is readily diagnosed by the scattered red-brown patches with scaly centres, distributed mainly on the trunk. There may be a history of the "herald patch", ten to fourteen days before the general rash comes out.

*Prickly heat*, the intense pricking and burning of hot countries, usually unaccompanied by any other obvious rash, or by an erythema only, is too well known to those living in tropical climates to present any difficulty in diagnosis.

*Clothing*, such as new woollen articles or those cleaned by chemicals, may cause generalized irritation. The diagnosis is usually made by careful questioning as to the coincidence of the pruritus with certain clothes. This is not always an easy cause to elicit.

#### GENERAL DISEASES CAUSING PRURITUS

*Infective hepatitis*.—Itching not infrequently precedes the appearance of the jaundice by a day or two; it will be accompanied by the usual prodromal symptoms of malaise, anorexia, possibly abdominal pains, vomiting, diarrhoea, or fever. The diagnosis is soon manifest. Other forms of obstructive jaundice, such as malignant, may also be accompanied by generalized pruritus.

*Hodgkin's disease*.—In this case the diagnosis remains obscure until the lymph gland enlargement, the splenomegaly or Pel Ebstein fever suggests the underlying cause of the itching, which will be proved by biopsy of a lymph gland.

*Leukæmia*.—Any of the leukæmias may have pruritus as an initial symptom. Gross enlargement of the spleen may be found, and a typical blood count will establish the diagnosis.

*Uræmia*.—Itching may be one of the most troublesome symptoms in uræmia. An examination of the urine, the blood chemistry and the blood pressure rapidly settle the diagnosis.

*Anxiety states*.—Generalized itching, sometimes described as a continuous feeling of something crawling under the skin, may be the somatic symptom of an anxiety neurosis. The patient's demeanour, the tremor and/or tachycardia will lead the physician to inquire for a definite cause for anxiety.

*Neurological disease*.—Two diseases of the central nervous system sometimes present with generalized pruritus, *tabes dorsalis* and *Parkinsonism* (paralysis agitans). The signs characteristic of neurological lesion will be found in such cases.

Thus in a case presenting with generalized pruritus as a main symptom, special points for consideration in the history will be:—rate and mode of onset, length of history, and any associations, such as contact with jaundice, crowded living conditions, and particular articles of clothing. Physical examination must include, in addition to a very careful examination of the skin, a search for splenic or glandular enlargement, a palpable liver or abnormal signs in the central nervous system.



the vaginal type. Douching with saline should be carried out forty-eight hours after the menstrual period, and on the following day a medical examination with microscopic tests for *Tr. vaginalis* should be carried out. If the condition appears to be cured and *Tr. vaginalis* are not found, treatment may be stopped, but the patient should be re-examined after the next two periods. She should be advised to be scrupulously careful regarding cleanliness of the perineum, washing and powdering frequently and avoiding faecal contamination of her person or clothing.

*Acute cases* are better treated by the doctor or a nurse for ten days. The vagina and vulva may be irrigated gently with saline, or weak sodium bicarbonate lotion to remove the pus; only low pressure should be permitted, with the douche-can not over 2 ft. above the pelvis. A sterile speculum is passed, and under direct vision the nurse swabs the vaginal walls with sterile gauze swabs and applies the 30 per cent. compound stovarsol powder, finally inserting two pessaries into the posterior vaginal fornix. If yeasts and other saprophytes are present, benefit follows painting with solution of brilliant green and crystal violet (B.P.C.) daily for one week. The nurse also cleanses the vulva and perineum and applies a sterile sanitary pad which is dusted heavily with compound acetarsol powder.

Some women appear to have a very low vaginal acidity with almost complete absence of *Doderlein's bacillus*, and in consequence the bacterial flora of the vagina tends to become of the faecal type. These women may benefit by using douches of lactic acid (1 in 1000) thrice weekly. Some women improve on treatment with small doses of stilbæstrol.

If the patient relapses, or if her husband has any history of balanitis or urethritis, he should be examined and treated, for reinfection of the woman by the male may occur.

As a rule *infection in the male* is cured rapidly and easily. The prepuce should be retracted fully, and the penis washed with soap and water, which is rinsed off completely with warm water, and then the surface is dried gently with cotton-wool or gauze, and given a light application of acetarsone (30 per cent.) in an absorbent powder base. If the male urethra is infested the patient should be given potassium citrate and sodium bicarbonate in sufficient doses to keep the urine strongly alkaline to litmus. This usually clears simple cases in ten days, but resistant cases may need instillations of antiseptics (e.g., 5 per cent. silver proteinate) twice daily for several weeks. If the prostate is involved the patient will require prostatic massage twice a week, supplemented by irrigation of the urethra or instillation of antiseptics, which in this case must be introduced into both anterior and posterior urethra. Silver pierate may be used as an alternative to acetarsone, but it is not markedly superior.

#### SUMMARY

The clinical condition is fairly characteristic but an accurate diagnosis can be made in a few minutes by microscopic examination of fresh specimens.

Treatment with acetarsone in the form of vaginal pessaries and powder is very successful but must be carried out for a considerable time and with attention to detail. Relapse is common, but reinfection from a male partner must be excluded.

ROBERT LEES, M.D., F.R.C.P.ED.

### THE DIAGNOSIS OF PRURITUS

PRURITUS or itching of the skin may be general or focal and is the presenting symptom in a number of diseases: the symptom is caused by subthreshold stimulation of pain nerve endings.

#### GENERALIZED PRURITUS

This is the first symptom of many *skin diseases* and may be felt before any rash is noticed by the patient.

urious. If there have been repeated marriages, however, rest should be stressed, n bed if necessary. It is believed (Diddle, *Amer. J. Obstet.*, 1944) that even hard travelling does not increase the abortion rate.

KENNETH BOWES, M.D., M.S., F.R.C.S.

### *The Treatment of Long-standing Urethral Discharge*

QUERY.—Will penicillin completely eradicate an old-standing chronic gleet which is probably due to a residual infection, and if so, what are the details concerning dosage and duration of administration? Is any other treatment necessary to ensure a complete cure?

REPLY.—It is difficult to answer this question in a few words. It would be helpful to know whether the original infection was gonococcal or not, and whether the patient has been thoroughly investigated to exclude the possibility of such conditions as chronic prostatic abscess, urethral stricture or some lesion higher in the urinary tract. Also, what, if anything, can be grown from the urethral pus. Even assuming that there is no complicating condition it is not very likely that penicillin would clear up such a discharge. After full investigation it would be worth trying, for it does no harm. For dosage I suggest 40,000 units of sodium penicillin given two-hourly for five doses—total 200,000 units, or a single dose of 250,000 units of calcium penicillin in oil-beeswax mixture. Other treatment depends upon the results of investigation. If the condition is uncomplicated and penicillin fails it would be worth while to try sulphonamides, e.g., sulphathiazole, 5 gm. daily for five days, low pressure urethro-vesical irrigations (potassium permanganate 1:10,000) once or twice daily, or a series of pyrexial reactions with intravenous vaccine (e.g. T.A.B.).

AMBROSE KING, F.R.C.S.

### *The Etiology of Cardiac and Renal Œdema*

QUERY (from Quebec).—I should be grateful if you could supply me with information concerning the possible etiology of cardiac and renal Œdema. There has been an awakening of interest in regard to the pathological physiology of this clinical phenomenon on this continent since it has been found that the copious administration of fluids will in many cases promote diuresis and produce a significant decrease in the water content of the tissues. What is the rôle of the sodium ion? I believe that it is considered to play a predominating extracellular part in tissue physiology, in contrast to the potassium

ion which penetrates the cellular membrane to constitute an important member of the intracellular paternity. The Œdematous state has been defined as a collection of dehydrated cells in a brine-bogged body. In other words, the extracellular sodium ions, safely in the interstitium have by osmosis attached unto themselves all the available water. What would be the effect of an intravenous infusion of isotonic or hypertonic KCl? Could excessive sodium excretion in Œdema be provoked by administering potassium salts, as in the provocative test for Addison's disease? If so, would the Œdema decrease? Has any information as to the essential nature of Fishberg's pre-renal deviation of sodium chloride come to light?

REPLY.—This is still one of the most debated problems in medicine. It is known that cardiac and renal Œdema are due solely to an excess of sodium chloride and water. Although local factors, such as increased metabolites, previous stretching of the tissues by Œdema, increased venous pressure due to gravity and decreased lymphatic return due to immobility, all play a part in the localization of the fluid, it is believed by most authorities (that is, by people actively engaged in research on the problem, not arm-chair pundits), that the fundamental cause of this retention is decreased renal excretion of sodium and chloride ions with the resultant retention of water to preserve osmotic balance. In cardiac failure, renal blood flow is decreased even more than cardiac output. With decreased renal blood flow, there is initially a decreased NaCl filtration in the glomeruli, as also happens in nephritis when the glomerular capillaries are attacked. Because of the low filtration rate, the tubules (which are undamaged) are able to re-absorb a larger proportion of the NaCl reaching them than they would in ordinary circumstances. Thus, these two renal mechanisms combine to produce sodium chloride retention. There is little evidence that there is intracellular dehydration in these conditions. Potassium salts will often produce a small diuresis, but this is not more than is produced by other substances, such as sodium sulphate. It must be remembered that intravenous administration of potassium salts will lead rapidly to fatal heart block unless very dilute solutions are used; some patients with renal failure die of potassium poisoning, even without the physician's aid.

E. G. L. BYWATERS, M.B., M.R.C.P.

### *Dystrophy of Nails in an Infant*

QUERY.—The patient is a baby, two months old. The great toe nails are hard, enlarged, and are of a yellowish brown colour, too hard for

## SENILE PRURITUS

This is very intractable. The elderly patient complains bitterly of an intense long-standing, continuous itching; no skin lesion or general disease will be found to cause it.

## FOCAL PRURITUS

*Pruritus ani.*—Apart from the irritation due to local dirt, this is commonly secondary to some local disease of the rectum or anus; special search should therefore be made for hæmorrhoids, fistula, fissure, and neoplasms of the lower rectum. In children, helminthiasis, chiefly with *oxyuris vermicularis*, is a frequent cause of pruritus ani, and is particularly liable to disturb sleep; the worms may be present from time to time in very large numbers, and may spread into the vagina.

In adults many cases are encountered in which there is no local lesion apparent, apart from a soggy condition of the anal region, with condylomas, all probably secondary to scratching and then infection. The pruritus in these cases may be a manifestation of an anxiety state, and is often intractable or liable to relapse. Syphilitic lesions are occasionally found.

*Pruritus vulvæ.*—This again is secondary to a local lesion. *Leukoplakia* is one cause, commonly involutional. Itching may also be the presenting symptom of a cervical erosion, or of a chronic vaginitis of which a frequent cause is infection with *Trichomonas vaginalis*, although *B. coli*, gonococci, streptococci or staphylococci may be the organisms producing it. A carcinoma of the cervix may present with pruritus. A very common cause of pruritus vulvæ, especially in women over forty-five, is *diabetes mellitus*, and the patient may deny any of the classical symptoms of the disease, such as thirst, polyuria, loss of weight or energy. Pruritus may arise in the course of treatment of diabetes even when the glycosuria is adequately controlled. Examination for the cause of pruritus vulvæ must always include testing the urine for sugar, as well as local inspection and vaginoscopy.

HECTOR GOADBY, M.D., F.R.C.P.

## NOTES AND QUERIES

*The Treatment of Threatened Abortion*

QUERY.—It is usual to give progesterone in cases of threatened abortion, and in addition, according to some authorities, vitamin E preparations should also be given. What is the usual dosage of these preparations and for how long must they be given? Should a patient who has had some hæmorrhage during the early months of her pregnancy be discouraged from continuing her work until the end of pregnancy, even if the bleeding was only of very short duration?

REPLY.—Apart from all agreeing that rest is essential for the patient who is threatening to abort, treatment is a matter of discussion and opinion. Probably the outcome depends much upon the normality of the ovum and the uterus. Progesterone is given on the basis of its physiological action of rendering the uterus less active, and also because it has been shown that in some patients there is a deficiency in the production of progesterone during early preg-

nancy. Whether it is truly efficacious or not is difficult of proof as no large series of a controlled experiment has been published. It appears probable, however, that it is beneficial. The dosage is 10 mgm. by intramuscular injection on the first day of the loss and then 5 mgm. daily while the loss continues. Usually a week or so of this treatment suffices, but if slight loss persists, or should the patient have had several miscarriages, it may be wise to continue with injections of 2 mgm. three weekly up to the end of the third or fourth month. An oral analogue may be given instead in larger doses. Vitamin E in capsules of 3-5 minims (0.18-0.3 c.c.m.) t.d.s. is often given in addition. Its efficacy is more open to discussion. Theoretically the action is one of balancing the oestrogen and progesterone hormones (Shute). Some modern authorities, e.g. Meaker, believe that progesterone alone is less likely to prove effective than progesterone aided by small doses of oestrogen (e.g. hexoestrol, 1 mgm. t.d.s.). In the type of case mentioned it is unlikely that work of a non-strenuous kind would be in-

and in apparently curing it when given within a reasonable time of the onset of the condition. The clinical material consists of only seven cases of glomerulonephritis, but the results are described as "more than encouraging". Full records are given of these patients. No beneficial effect was noted in chronic nephritis. The usual dosage of antistine was 0.1 to 0.2 gm. every three hours for the first week, some being given by mouth and some intramuscularly. Subsequently the dosage was gradually reduced. The total period over which antistine was given was up to three weeks. Stress is laid upon the necessity for giving the patient a low-salt, low-protein diet with ample vitamins.

### *The Treatment of Motion Sickness*

A REPORT of the results of an investigation carried out under the auspices of the National Research Council of Canada for the evaluation of drugs for the prevention or alleviation of motion sickness is given by R. L. Noble, E. A. Sellars, and C. H. Best (*The Canadian Medical Association Journal*, April 1947, 56, 417). Of the belladonna alkaloids hyoscine is the most effective, but a mixture of hyoscine and hyoscyamine may have less unpleasant or dangerous side-effects. It was found in healthy young men of average size (70 kgm.) that an initial dose of 0.3 mgm. hyoscine HBr plus 0.8 mgm. hyoscyamine HBr was effective, protection lasting from six to ten hours. Subsequent doses should not exceed one-half the initial dose and should be separated by an interval of eight hours or more. The only adverse effect noted was dryness of the mouth. Children have a lower tolerance to belladonna than adults. Of the barbiturates, V-12 (ethyl- $\beta$ -methyl-allyl thiobarbituric acid: Abbott Laboratories), whilst possessing as good or better protective properties, has such a low depressant action that doses of 315 mgm. or more could be tolerated without undesirable side-effects. There is considerable individual variation to effective dosage, but it was found that the best results were obtained when therapy was instituted on the day before exposure to motion. Divided doses are preferable and few individuals show undesirable reactions if 155 mgm. is taken with breakfast and 155 mgm. with supper. Taking V-12 with meals is desirable as absorption is prolonged thereby. In resistant cases an extra 155 mgm. may be taken with the midday meal. Therapy should be continued during short trips, but the duration of protection after the drug is stopped is about fifteen to eighteen hours. The immediate symptom of overdosage is sleepiness, which should be used in assessing individual tolerance, and is a contraindication to increase of dosage. It is stated that in no case should a total daily dosage

of more than 460 mgm. be used, and in cases requiring this large dosage a reduction after one or two days is advisable. A mixture called the "Canadian Motion Sickness Remedy", and consisting of

Hyoscine HBr .....	0.1 mgm.
Hyoscyamine HBr .....	0.3 mgm.
V-12 (ethyl- $\beta$ -methyl-allyl thiobarbituric acid) .....	130 mgm.

is commended, the suggested dosage being 2 capsules taken two to four hours before exposure to motion, followed by one capsule every eight to twelve hours. In highly susceptible individuals the therapy may be started twenty-four hours before exposure to motion. Dosage should be reduced on the occurrence of undue hypnosis and dryness of the mouth, and in no case should more than three capsules be taken in twenty-four hours. For children and small adults the dosage should be reduced. Treatment with these capsules should never be given for more than five days each week or undue accumulation of the thiobarbiturate may occur.

### *Intravenous Injections of Milk Protein in the Treatment of Gastro-Duodenal Ulcers*

USING a mixture of dried milk 0.50, glucosed serum 2.25, and sodium hyposulphite 2.25, G. Faroy, J. Arnous and J. Fénéon (*Presse Médicale*, May 10, 1947, 55, 313) have treated a series of cases of gastric and duodenal ulcer by the following technique:—The patient receives a series of 15 to 18 intravenous injections in progressive dosage, the injections being given three times weekly. The first injection is 1 c.cm. (equal to 1/10 c.cm. of milk), then the dose is increased to 2, 3, 5, 8 c.cm. up to 10 c.cm., which as a rule is not exceeded. The increase in dosage is made only if the patient shows no signs of reaction. Frequently in the hours following an injection shivering and slight rise in temperature may occur; if such reactions are marked a return is made to the immediately preceding lower dosage. The injections are given preferably on a fasting stomach, and if the patient has shown some signs of reaction 20 to 30 drops of 1/1000 adrenaline are given before the injection. In highly sensitive subjects synthetic antihistamine drugs proved useful if given before and after the protein injection. In the treated series lasting success was obtained in 46 per cent., temporary success in 41 per cent., and in 13 per cent. the treatment failed. The action on the pain was as a rule marked and constant, particularly in chronic cases in which conservative treatment had failed. As regards the effect on the ulcer cavities, in many cases there was rapid clearing, and in duodenal cases the oedematous halo disappeared leaving an indelible

ordinary scissors to cut. The other nails appear normal. I should be glad if any indication could be given as to the condition and the method of treatment, if necessary.

REPLY.—It is obvious that the condition referred to is a dystrophy of the nails, and is therefore likely to persist and may lead to a hypertrophic nail or onychogryphosis. The only thing to do at present is to cut the nail when necessary with nail clippers of stout pattern, and if the nail becomes very hypertrophic and likely to account for an orthopaedic disability it will probably be necessary to excise completely the nail matrix.

REGINALD T. BRAIN, M.D., F.R.C.P.

### *The Treatment of Besnier's Prurigo*

QUERY.—I should be glad of your help in the case of a male patient, aged thirty-eight, with congenital Besnier's prurigo. I think he has had every recognized treatment, from lotions and cream to X-rays. The East wind aggravates his condition. He is an intelligent man who realizes that mental upsets in his daily life lead to a fresh exacerbation of the condition. I fear he is becoming an introvert and rather neurotic about his condition. Could you outline the standard treatment for this condition, with any other suggestion you may care to make?

REPLY.—Presumably this patient comes into the eczema-asthma-hay-fever group. Benadryl would be worth trying as a palliative, say 50 mgm. three times a day, for short courses of a week or so at a time. As noted, these patients commonly have a neurotic make-up and their skin condition is adversely affected by emotional upset, nervous strain and worry. They have to try and organize their life accordingly, as they themselves generally come to recognize. Local treatment to the skin is of less importance than adjustment of the psychogenic factors and depends largely upon what type of skin the patient has. If, as appears to be the case here, it is sensitive and intolerant to external irritants of various kinds, it is best to use only bland applications, such as plain zinc cream, zinc

cream containing ichthyol 1 to 2 per cent., or zinc cream or paste with solution of coal tar 2 to 5 per cent. Occasional courses of superficial X-rays to certain areas, e.g. flexures, are usually of great help. There is, however, no standard treatment for a condition such as this, in which the skin reacts to a variety of psychological and external trigger factors.

E. W. PROSSER THOMAS, M.D.

### *Continuous Pyrexia*

QUERY.—I have a boy patient aged twelve years. He has had a practically continuous pyrexia for six months, varying from 99° to 100° F. (37.2° to 37.8° C.). He seems moderately fit in himself and his blood count, sedimentation rate, X-rays of chest and abdomen are normal. His tonsils, which were rather unhealthy, were removed about two weeks ago but he is still running the temperature. He is a highly strung, nervous child, and I wondered if it was possible for his nervous condition by itself to be the cause of his pyrexia.

REPLY (from a paediatrician).—It is a good working rule that, with the exception of heat stroke and similar gross disorders of the heat regulating mechanism (i.e., dehydration), a persistent fever is due to infection. It is, of course, possible that there are some children of a nervous type whose temperature control is more easily upset than others. They will therefore more easily run bouts of pyrexia as a result of relatively trivial infections and, in general, they tend to run light fevers with associated nervous disturbances, such as delirium and even convulsions. The answer to the question is therefore that the nervous state of the child is not the cause of the fever, although it may contribute towards it. It would be impossible without further evidence to make any very helpful suggestions as to diagnosis, but a period in an institution equipped with all the necessary facilities would probably help. These continued pyrexial cases, so very common in paediatric practice, can never be settled by a single consultation.

## PRACTICAL NOTES

### *Treatment of Acute Nephritis by Anti-Histamine Substances*

Whilst there is still no unanimity as to the etiology of acute glomerulonephritis, the general consensus of opinion at the moment is that it is an allergic reaction—usually to a hæmolytic streptococcal infection in the upper respiratory tract. Starting from this hypothesis, François Reubi ("Le traitement de la néphrite aiguë par

les antihistaminiques de synthèse". Basle; Benno Schwabe & Co., 1946) has investigated the action of antistine, one of the recently introduced synthetic antihistamine drugs (see also *The Practitioner*, June, 1947, 158, 482). The preliminary experiments on rabbits indicated that antistine was of value both as a prophylactic, when given early enough, in preventing the onset of acute glomerulonephritis,

and in apparently curing it when given within a reasonable time of the onset of the condition. The clinical material consists of only seven cases of glomerulonephritis, but the results are described as "more than encouraging". Full records are given of these patients. No beneficial effect was noted in chronic nephritis. The usual dosage of antistine was 0.1 to 0.2 gm. every three hours for the first week, some being given by mouth and some intramuscularly. Subsequently the dosage was gradually reduced. The total period over which antistine was given was up to three weeks. Stress is laid upon the necessity for giving the patient a low-salt, low-protein diet with ample vitamins.

### *The Treatment of Motion Sickness*

A REPORT of the results of an investigation carried out under the auspices of the National Research Council of Canada for the evaluation of drugs for the prevention or alleviation of motion sickness is given by R. L. Noble, E. A. Sellars, and C. H. Best (*The Canadian Medical Association Journal*, April 1947, 56, 417). Of the belladonna alkaloids hyoscine is the most effective, but a mixture of hyoscine and hyoscyamine may have less unpleasant or dangerous side-effects. It was found in healthy young men of average size (70 kgm.) that an initial dose of 0.3 mgm. hyoscine HBr plus 0.8 mgm. hyoscyamine HBr was effective, protection lasting from six to ten hours. Subsequent doses should not exceed one-half the initial dose and should be separated by an interval of eight hours or more. The only adverse effect noted was dryness of the mouth. Children have a lower tolerance to belladonna than adults. Of the barbiturates, V-12 (ethyl- $\beta$ -methyl-allylthiobarbituric acid: Abbott Laboratories), whilst possessing as good or better protective properties, has such a low depressant action that doses of 315 mgm. or more could be tolerated without undesirable side-effects. There is considerable individual variation to effective dosage, but it was found that the best results were obtained when therapy was instituted on the day before exposure to motion. Divided doses are preferable and few individuals show undesirable reactions if 155 mgm. is taken with breakfast and 155 mgm. with supper. Taking V-12 with meals is desirable as absorption is prolonged thereby. In resistant cases an extra 155 mgm may be taken with the midday meal. Therapy should be continued during short trips, but the duration of protection after the drug is stopped is about fifteen to eighteen hours. The immediate symptom of overdosage is sleepiness, which should be used in assessing individual tolerance, and is a contraindication to increase of dosage. It is stated that in no case should a total daily dosage

of more than 460 mgm. be used, and in cases requiring this large dosage a reduction after one or two days is advisable. A mixture called the "Canadian Motion Sickness Remedy", and consisting of

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### *Intravenous Injections of Milk Protein in the Treatment of Gastro-Duodenal Ulcers*

USING a mixture of dried milk 0.50, glucosed serum 2.25, and sodium hyposulphite 2.25, G. Faroy, J. Arnous and J. Fénéon (*Presse Médicale*, May 10, 1947, 55, 313) have treated a series of cases of gastric and duodenal ulcer by the following technique:—The patient receives a series of 15 to 18 intravenous injections in progressive dosage, the injections being given three times weekly. The first injection is 1 c.cm. (equal to 1/10 c.cm. of milk), then the dose is increased to 2, 3, 5, 8 c.cm. up to 10 c.cm., which as a rule is not exceeded. The increase in dosage is made only if the patient shows no signs of reaction. Frequently in the hours following an injection shivering and slight rise in temperature may occur: if such reactions are marked a return is made to the immediately preceding lower dosage. The injections are given preferably on a fasting stomach, and if the patient has shown some signs of reaction 20 to 30 drops of 1/1000 adrenaline are given before the injection. In highly sensitive subjects synthetic antihistamine drugs proved useful if given before and after the protein injection. In the treated series lasting success was obtained in 46 per cent., temporary success in 41 per cent., and in 13 per cent. the treatment failed. The action on the pain was as a rule marked and constant, particularly in chronic cases in which conservative treatment had failed. As regards the effect on the ulcer cavities, in many cases there was rapid clearing, and in duodenal cases the oedematous halo disappeared leaving an indelible

ordinary scissors to cut. The other nails appear normal. I should be glad if any indication could be given as to the condition and the method of treatment, if necessary.

REPLY.—It is obvious that the condition referred to is a dystrophy of the nails, and is therefore likely to persist and may lead to a hypertrophic nail or onychogryphosis. The only thing to do at present is to cut the nail when necessary with nail clippers of stout pattern, and if the nail becomes very hypertrophic and likely to account for an orthopaedic disability it will probably be necessary to excise completely the nail matrix.

REGINALD T. BRAIN, M.D., F.R.C.P.

### *The Treatment of Besnier's Prurigo*

QUERY.—I should be glad of your help in the case of a male patient, aged thirty-eight, with congenital Besnier's prurigo. I think he has had every recognized treatment, from lotions and cream to X-rays. The East wind aggravates his condition. He is an intelligent man who realizes that mental upsets in his daily life lead to a fresh exacerbation of the condition. I fear he is becoming an introvert and rather neurotic about his condition. Could you outline the standard treatment for this condition, with any other suggestion you may care to make?

REPLY.—Presumably this patient comes into the eczema-asthma-hay-fever group. Benadryl would be worth trying as a palliative, say 50 mgm. three times a day, for short courses of a week or so at a time. As noted, these patients commonly have a neurotic make-up and their skin condition is adversely affected by emotional upset, nervous strain and worry. They have to try and organize their life accordingly, as they themselves generally come to recognize. Local treatment to the skin is of less importance than adjustment of the psychogenic factors and depends largely upon what type of skin the patient has. If, as appears to be the case here, it is sensitive and intolerant to external irritants of various kinds, it is best to use only bland applications, such as plain zinc cream, zinc

cream containing ichthyol 1 to 2 per cent., or zinc cream or paste with solution of coal tar 2 to 5 per cent. Occasional courses of superficial X-rays to certain areas, e.g. flexures, are usually of great help. There is, however, no standard treatment for a condition such as this, in which the skin reacts to a variety of psychological and external trigger factors.

E. W. PROSSER THOMAS, M.D.

### *Continuous Pyrexia*

QUERY.—I have a boy patient aged twelve years. He has had a practically continuous pyrexia for six months, varying from 99° to 105° F. (37.2° to 37.8° C.). He seems moderately fit in himself and his blood count, sedimentation rate, X-rays of chest and abdomen are normal. His tonsils, which were rather unhealthy, were removed about two weeks ago but he is still running the temperature. He is a highly strung, nervous child, and I wondered if it was possible for his nervous condition by itself to be the cause of his pyrexia.

REPLY (from a paediatrician).—It is a good working rule that, with the exception of heat stroke and similar gross disorders of the heat regulating mechanism (i.e., dehydration), a persistent fever is due to infection. It is, of course, possible that there are some children of a nervous type whose temperature control is more easily upset than others. They will therefore more easily run bouts of pyrexia as a result of relatively trivial infections and, in general, they tend to run light fevers with associated nervous disturbances, such as delirium and even convulsions. The answer to the question is therefore that the nervous state of the child is not the cause of the fever, although it may contribute towards it. It would be impossible without further evidence to make any very helpful suggestions as to diagnosis, but a period in an institution equipped with all the necessary facilities would probably help. These continued pyrexial cases, so very common in paediatric practice, can never be settled by a single consultation.

## PRACTICAL NOTES

### *Treatment of Acute Nephritis by Anti-Histamine Substances*

Whilst there is still no unanimity as to the etiology of acute glomerulonephritis, the general consensus of opinion at the moment is that it is an allergic reaction—usually to a hæmolytic streptococcal infection in the upper respiratory tract. Starting from this hypothesis, François Reubi ("Le traitement de la néphrite aiguë par

les antihistaminiques de synthèse". Basle Benno Schwabe & Co., 1946) has investigated the action of antistine, one of the recently introduced synthetic antihistamine drugs (see also *The Practitioner*, June, 1947, 158, 482). The preliminary experiments on rabbits indicated that antistine was of value both as a prophylactic, when given early enough, in preventing the onset of acute glomerulonephritis,

and in apparently curing it when given within a reasonable time of the onset of the condition. The clinical material consists of only seven cases of glomerulonephritis, but the results are described as "more than encouraging". Full records are given of these patients. No beneficial effect was noted in chronic nephritis. The usual dosage of antistine was 0.1 to 0.2 gm. every three hours for the first week, some being given by mouth and some intramuscularly. Subsequently the dosage was gradually reduced. The total period over which antistine was given was up to three weeks. Stress is laid upon the necessity for giving the patient a low-salt, low-protein diet with ample vitamins.

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scar. The action was more definite in ulcers of short duration, but some long-standing cases responded well to the treatment. The treatment is contraindicated in all cases in which shock therapy is contraindicated, i.e., evolutive pulmonary tuberculosis, nephritis, and cardiac affections.

### *Occupational Cancer of the Bladder*

THE signs and symptoms of carcinoma of the bladder among dye workers who are exposed to aniline, benzidine and naphthalene are discussed by M. W. Goldblatt (*British Medical Bulletin*, 1947, 4, 405). The symptoms of occupational bladder tumour are no different from those of a non-occupational tumour, but in the case of the dye worker the causal factor is known and if routine cystoscopy is adopted there is a chance of preventing the worse forms of the disease. Absorption is by the respiratory route by inhalation of the dust and fumes. After a latent period during which there are no external signs or symptoms there may be a sudden hæmaturia with little or no discomfort or pain; or the first onset may be by the appearance of epithelial cells and a few erythrocytes in the urine; again without symptoms. Examination of the bladder may show little change of significance. Years may elapse between the first attack of hæmaturia and the demonstrable presence of a tumour, and during this time the patient's condition is usually quiet and undisturbed. Hæmaturia is not necessarily evidence of the presence of a tumour, and the degree of hæmaturia has no relation to the degree of malignancy. In some cases the only symptom complained of is backache in conjunction with slight hæmaturia, but cystoscopy may reveal an inoperable cancer. On the other hand severe hæmaturia may occur and only two or three small papillomas without malignancy be present. The presence of leucocytes in the urine, however, indicates ulceration of either the bladder wall or the surface layer of a tumour. Great pain on micturition may occur due to the formation of thrombi following hæmaturia, and acute retention has also been observed. As regards pain, this depends upon the infiltration and invasion of the bladder wall and pelvic tissues: pain in the bottom of the back, the suprapubic area, or in the hypogastrium may be complained of; at the late stage, however, pain is almost persistently present. Prophylaxis includes increased fluid intake and a diuretic during the working day or shift, the maintenance of the urine on the 'd' side, and the administration of a urinary septic is stated possibly to have a place. Treatment is that of acute hæmorrhagic cystitis, th rest, bland diet and bladder sedatives and

diuretics. Surgical intervention is the same as for non-occupational tumour.

### *A Non-Irritating Surgical Glove Powder*

A NUMBER of references have recently appeared in the literature concerning the dangers involved in the use of talc as a powder for surgeons' gloves (*The Practitioner*, January 1947, 158, 93), and a recent investigation carried out by C. Marshall Lee and E. P. Lehman (*Surgery, Gynecology and Obstetrics*, April 15, 1947, 84, 689) confirms these reports. The authors have carried out tests in dogs with eleven different powders.

Under strict aseptic conditions the abdomen was opened through a standard rectus incision and the powder dusted over the wound. The wound was then being closed. The dog was rec. out. When n. in those dogs in which talcum was used dense generalized adhesions were present, even when the test dose was reduced to 1/16 of a teaspoonful; equally extensive adhesions were present after the use of talc, zinc oxide powder; with the use of a fine corn starch derivative powder no adhesions formed in the experimental animals and observation showed that the powder was completely absorbed from the peritoneum without causing any inflammatory reaction.

This powder is stated to possess excellent physical qualities of flow and fineness, to be unaffected by autoclaving, and to show complete sterility under standard autoclaving after known contamination with spores of a heat-resistant organism.

### *Splanchnic Block in Hirschsprung's Disease*

SYMPLECTOMY in the treatment of Hirschsprung's disease, or megacolon, is not without its risks. Spinal analgesia, which has also been used successfully in treatment, has its dangers too, as a high spinal block to the level of D4 is necessary. Impressed with the results of spinal analgesia, J. Scholfield and E. Chivers (*British Journal of Anaesthesia*, January 1947, 20, 84) have investigated the effect of splanchnic block in five cases. Anethaine or amethocaine hydrochloride with adrenaline was used by the Kappis method of posterior splanchnic block. The results of treatment were satisfactory in four of the patients, who have now been symptom-free for periods ranging from eighteen months to three-and-a-half years. It is concluded that "as splanchnic block is a method of treatment of Hirschsprung's disease, has proved satisfactory in these patients, and as it appears to have fewer dangers and complications than most other forms of treatment used for this condition, it is worth while trying it before using more drastic forms of treatment".

### *Synthetic Thyroproteins in Myxœdema and Obesity*

THE value of a synthetic thyroprotein, consisting of proteins extracted from the blood to which iodine is added, is demonstrated by F. Rocca (*Archives Uruguayas de Medicina, Cirugía y Especialidades*, September 1946, 29, 243). Using an iodo-protein substance, the biological actions of which were recorded by the author and Albriex in an earlier communication (*Archiv. Soc. Biol. Montevideo*, 1944, 12, 139), a group of patients, including two with myxœdema, were treated with dosage of 1 to 4 tablets of 5 centigrammes daily. In both myxœdema and obesity with hypothyroidism the characteristic clinical signs of thyroid insufficiency disappeared. In individuals with normal basal metabolism the calorogenic action was evident with relatively small doses of 5 to 10 centigrammes daily, but the decrease in weight was not constant and in some cases was very limited. In these cases excitation of the sympathetic (tachycardia, palpitation, tremor) was only slight and not in accord with the raised basal metabolism. Both patients with myxœdema had previously received thyroidine. One of these patients had a colloid goitre which decreased in size with thyroidine therapy but increased again on suspension of the treatment. With iodo-protein therapy the clinical improvement and reduction in size of the goitre were maintained for several months after interruption of treatment. After the third administration of thyroprotein the basal metabolism reached a persistently higher level which was maintained three months later. After six months' treatment the signs of hyperthyroidism were only slight and the goitre was palpated with difficulty. In the other case of myxœdema, thyroprotein treatment resulted in the disappearance of a troublesome hyperkeratosis of both feet, which had showed no improvement with thyroidine therapy. In the patients with obesity the increase in the basal metabolism was variable: in some cases an appreciable reduction in weight was obtained. It was found that when the dosage exceeded 0.15 gm. neuro-vegetative and cardio-circulatory symptoms usually occurred, necessitating interruption of treatment. In conclusion, the author states that synthetic thyroprotein advantageously replaces thyroid extract and appears to have a more prolonged and specific mode of action. In obesity its calorogenic action is well tolerated.

### *More Pleasant Medicines*

Using quinine bisulphate and urea as their

test substances, Eleanor Boothe and K. L. Kaufman (*Journal of the American Pharmaceutical Association*, February 1947, 8, 68) have investigated the problem of the most effective method of masking the taste of bitter drugs. In the case of quinine bisulphate the following are the flavourings that they found most effective: spirits of cinnamon and orange compound, emulsions of orange and lemon oils, crème de menthe extract, oil of peppermint, and the syrup of cacao and acacia. Of the imitation flavours that are readily available, inexpensive and easy to use, the following were effective: root beer extract, peach, cherry, blackberry, grape and pistachio. The oils of fennel, star anise, cassia and lemon were also of value. In the case of urea solutions the mints, the oils of star anise and cassia, and orange spirit were effective. The syrups of acacia and cacao were less effective than in the case of quinine, whilst, conversely, the tincture of sweet orange peel and several artificial flavours, including liquorice, plum, apricot, grape and raspberry, were more effective in masking the taste of urea than that of quinine.

### *Dangers of Roller Skating*

ACCORDING to E. W. Klinefelter (*Journal of Bone and Joint Surgery*, January 1947, 29, 237), injuries resulting from roller-skating are frequent, particularly acute and chronic strains of the tibial collateral ligament of the knee, associated with ossification. Such strains are produced by movements such as the "split" in figure skating and affect the lower half of the ligament. They are more liable to occur in obese women. The strain develops gradually, symptoms seldom appearing until after three years of skating. At first there is only slight pain, sometimes accompanied by a feeling of rubbing, and the day after skating the knee feels stiff. Examination at this stage reveals some localized tenderness, and an X-ray film may show a swollen ligament. A few days' rest results in the disappearance of symptoms. Checking movements are most likely to cause a recurrence of symptoms, and if the patient persists in these and strenuous skating, ossification occurs in the tibial attachments of the tibial collateral ligament and of the popliteus and soleus muscles. If strenuous skating is still persisted in the ossification becomes more marked and pain may become so severe as to render skating impossible. With rest this severe pain tends to disappear in a few days, but there may be residual soreness and stiffness persisting for several months. In treatment X-ray therapy has been found most effective.

## REVIEWS OF BOOKS

*An Integrated Practice of Medicine.* By HAROLD THOMAS HYMAN, M.D. London and Philadelphia: W. B. Saunders Company, 1947. Pp. 4621. Illustrations 1184; 305 in colour and 319 tables. In 4 volumes with separate diagnosis and subject index. Price 250s. complete.

THIS is an admirable attempt to depart from the stereotyped clinical textbook and to present clinical problems in an integrated form. The author's object has been to write his book around "the complaints which bring the patient to you", and this has necessitated frequent use of diagnostic tables and rather fatiguing cross-references. These tables are, however, carefully compiled and exhaustive, and will provide a useful reference for differential diagnosis. The first volume includes a good account of the infective fevers, excellently illustrated by colour plates, and an extensive review of the modern treatment of syphilis. The chapters on metabolism, diet and vitamins are particularly useful, but the succeeding chapters dealing with the circulatory system have been marred by the inclusion of numerous confusing electrocardiograms with involved explanations of their interpretation. The chapters on diseases of the blood are well presented and contain a useful selection of coloured illustrations. The chapters on psychiatry include a commendable account of the rôle of the general practitioner in this sphere, and psychiatry and neurology in general are particularly well covered. Endocrinology has received due attention, and the account of the treatment of thyrotoxicosis is in every way a model. Other chapters which call for special mention include those on the oropharynx (in which differential diagnosis is clearly illustrated by a good series of clinical photographs) and that on the alimentary tract, which includes some excellent X-rays. The section on pædiatrics is disappointingly limited to thirty-eight pages, the bulk of which cover neonatal conditions. This section might well be enlarged at the expense of that on "the tegumentary system" which is far too full and excessively detailed, covering 366 pages. The concluding chapters include useful accounts of occupational hazards, and of the economics of private practice. Dr. Hyman and his colleagues are to be congratulated on having produced a most useful and comprehensive reference book which will be assured of a warm welcome from physicians and practitioners.

*Child Health and Development: A Symposium by Specialist Contributors.* EDITED BY R. W. B. ELLIS, O.B.E., M.D., F.R.C.P. London: J. & A. Churchill Ltd., 1947. Pp. viii and 364. Figures 49. Price 21s.

THIS latest book on the modern lines of "Child Health" as opposed to "Pædiatrics" is a most useful addition to the literature on the subject. It is full of valuable information, authoritative and well produced. The editor, whose personal contributions are among the best in the book, has chosen his contributors wisely. The book is divided into two parts, the first eleven chapters being essentially clinical and the remainder factual. There are two appendices, one on the Rhesus factor, and the other a list of the names and activities of organizations connected with Child Health. In Part I the development of the normal child, both physical and intellectual, is described and there is also a chapter by Miss Freud on emotional development. The first four chapters, by Professor F. J. Browne on antenatal and intranatal care (which brings out strikingly the necessity for close cooperation between obstetricians and pædiatricians), by the late Sir Joseph Barcroft on the functional development of the fetus, and by Professor Ellis on the newborn and digestion, nutrition and feeding, are outstandingly good. The second part of the book is concerned with social and child health services generally and contains many helpful statistics and much that will be of value for reference purposes. The inclusion of a chapter on milk by Professor Capstick adds to the value of the book. The illustrations and skiagrams are clearly reproduced and the printing and paper are good. The bibliography and references at the end of each chapter are complete and up-to-date. This book is to be commended to all who are interested in the furtherance of Child Health and in pædiatrics.

*The Rotunda Hospital 1745-1945.* By O'DONEL T. D. BROWNE, M.B., M.A.O., F.R.C.P., F.R.C.O.G. Edinburgh: E. & S. Livingstone, Ltd., 1947. Pp. xx and 296. Illustrations 44. Price 42s.

THE postponed celebrations of the bicentenary of the Rotunda Hospital are worthily inaugurated by this history of the hospital, written by a former Assistant Master. It is a straightforward account of the hospital from its foundation by Bartholomew Mosse to the present day, and to a large extent the author allows the hospital records to speak for them-

selves. The book is divided into six sections. The first two are devoted to a review of the development of the hospital under successive Masters. The remainder deal with puerperal fever, operative midwifery, anæsthetics and gynæcology, and eclampsia, with particular reference to the Rotunda. This arrangement involves a certain amount of repetition which could have been avoided by a strictly chronological approach to the subject. The value of the work is not enhanced by the author's diversions into the general medical history of the period, as, for instance, in his discussion of puerperal fever. There is sufficient history in the Rotunda itself without having to incorporate recapitulation of well-known facts. The history of the Rotunda is synonymous with that of the development of midwifery during the last two hundred years, and all who are concerned with the art of obstetrics, as well as the student of the history of medicine, will find the book of absorbing interest.

*The Birth of a Child.* By GRANTLY DICK READ, M.D. Wm. Heinemann (Medical Books) Ltd., 1947. Pp. viii and 99. Price 5s.

THE author's theory that pain in labour is the product of an artificial civilization and is due to fear and tension is now fairly well known, but those who are not familiar with his larger works are recommended to consider the sound advice in obstetric management given within the brief compass of this small book. Its form, a collection of papers written largely for nursing journals, results in inevitable repetition but the subject-matter is well worth attention.

#### NEW EDITIONS

*A Short Textbook of Midwifery*, by G. F. Gibberd, M.B., M.S., F.R.C.S., F.R.C.O.G., in its fourth edition (J. & A. Churchill Ltd., 21s.) contains a welcome section on the Rhesus factor and the rôle it plays in the etiology of erythroblastosis and hydrops fetalis: the author in his preface stresses the importance of collaboration between the obstetrician and pædiatrician in this connexion. The use of penicillin in the treatment of puerperal infections is another new addition to this well-known textbook, which has been brought up to date in all sections.

EXTENSIVE revision has been undertaken in the preparation of the second edition of *Modern Diagnosis*, edited by Alan Moncrieff, M.D., F.R.C.P., and William A. R. Thomson, M.D. ("The Practitioner Handbooks": Eyre and

Spottiswoode (Publishers) Ltd., 12s. 6d.). The estimation of the blood sedimentation rate by the Della Vida method has been included in the chapter on tuberculosis, the Westergren technique is described in detail in the chapter on chronic rheumatism, and in the chapter devoted to blood examinations the technique of the Wintrobe method is fully described. Much new information has been added to the chapter on the electrocardiogram in diagnosis and a number of new illustrations added, and the chapter on the basal metabolism has been largely rewritten. These are but a few of the advances included in the new edition of this handbook, which deals not only with the clinical methods of diagnosis but also their confirmation by the use of laboratory tests.

THE second edition of *Heparin in the Treatment of Thrombosis*, by J. Erik Jorpes, M.D. (Geoffrey Cumberledge, Oxford University Press, 18s.) is particularly welcome at the present moment when so much interest is being shown in the use of heparin and dicoumarol in the treatment of thrombotic conditions. Much of the credit for the great advances in the use of heparin is due to the Scandinavian workers, and outstanding amongst these is Dr. Jorpes himself. It is only eight years since the first edition was published, and it is some measure of the tremendous advances that have been made since then that so much has had to be added to this new edition. The revision has been thorough and makes the book the most important and authoritative survey of the subject in the English language. As Professor Learmonth points out in his foreword, "the monograph is complete". The biochemical, physiological and clinical aspects of both heparin and dicoumarol are all fully, yet succinctly, dealt with. This is a book which can justly be described as an essential component of the library of every medical practitioner.

*Sick Children: Diagnosis and Treatment*, by Donald Paterson, M.D., F.R.C.P., in its sixth edition (Cassell and Company Ltd., 16s.) has been extensively revised in order to bring it up to date with advances in pædiatrics during the three years since the appearance of its predecessor. New information has been added on hæmorrhagic disease of the newborn, on the use of penicillin, which infiltrates into many sections of the book, on new conceptions in the treatment of coliac disease, gastro-enteritis and epidemic jaundice—these are but a few of the new attractions of this well-known guide to pædiatrics which originates from the very hub of pædiatric efficiency, the Great Ormond Street Hospital for Sick Children.

## REVIEWS OF BOOKS

*An Integrated Practice of Medicine.* By HAROLD THOMAS HYMAN, M.D. London and Philadelphia: W. B. Saunders Company, 1947. Pp. 4621. Illustrations 1184; 305 in colour and 319 tables. In 4 volumes with separate diagnosis and subject index. Price 250s. complete.

THIS is an admirable attempt to depart from the stereotyped clinical textbook and to present clinical problems in an integrated form. The author's object has been to write his book around "the complaints which bring the patient to you", and this has necessitated frequent use of diagnostic tables and rather fatiguing cross-references. These tables are, however, carefully compiled and exhaustive, and will provide a useful reference for differential diagnosis. The first volume includes a good account of the infective fevers, excellently illustrated by colour plates, and an extensive review of the modern treatment of syphilis. The chapters on metabolism, diet and vitamins are particularly useful, but the succeeding chapters dealing with the circulatory system have been marred by the inclusion of numerous confusing electrocardiograms with involved explanations of their interpretation. The chapters on diseases of the blood are well presented and contain a useful selection of coloured illustrations. The chapters on psychiatry include a commendable account of the rôle of the general practitioner in this sphere, and psychiatry and neurology in general are particularly well covered. Endocrinology has received due attention, and the account of the treatment of thyrotoxicosis is in every way a model. Other chapters which call for special mention include those on the oropharynx (in which differential diagnosis is clearly illustrated by a good series of clinical photographs) and that on the alimentary tract, which includes some excellent X-rays. The section on pædiatrics is disappointingly limited to thirty-eight pages, the bulk of which cover neonatal conditions. This section might well be enlarged at the expense of that on "the tegumentary system" which is far too full and excessively detailed, covering 366 pages. The concluding chapters include useful accounts of occupational hazards, and of the economics of private practice. Dr. Hyman and his colleagues are to be congratulated on having produced a most useful and comprehensive reference book which will be assured of a warm welcome from physicians and practitioners.

*Child Health and Development: A Symposium by Specialist Contributors.* EDITED BY R. W. B. ELLIS, O.B.E., M.D., F.R.C.P. London: J. & A. Churchill Ltd., 1947. Pp. viii and 364. Figures 49. Price 21s.

THIS latest book on the modern lines of "Child Health" as opposed to "Pædiatrics" is a most useful addition to the literature on the subject. It is full of valuable information, authoritative and well produced. The editor, whose personal contributions are among the best in the book, has chosen his contributors wisely. The book is divided into two parts, the first eleven chapters being essentially clinical and the remainder factual. There are two appendices, one on the Rhesus factor, and the other a list of the names and activities of organizations connected with Child Health. In Part I the development of the normal child, both physical and intellectual, is described and there is also a chapter by Miss Freud on emotional development. The first four chapters, by Professor F. J. Browne on antenatal and intranatal care (which brings out strikingly the necessity for close cooperation between obstetricians and pædiatricians), by the late Sir Joseph Barcroft on the functional development of the fetus, and by Professor Ellis on the newborn and digestion, nutrition and feeding, are outstandingly good. The second part of the book is concerned with social and child health services generally and contains many helpful statistics and much that will be of value for reference purposes. The inclusion of a chapter on milk by Professor Capstick adds to the value of the book. The illustrations and skiagrams are clearly reproduced and the printing and paper are good. The bibliography and references at the end of each chapter are complete and up-to-date. This book is to be commended to all who are interested in the furtherance of Child Health and in pædiatrics.

*The Rotunda Hospital 1745-1945.* BY O'DONEL T. D. BROWNE, M.B., M.A.O., F.R.C.P., F.R.C.O.G. Edinburgh: E. & S. Livingstone, Ltd., 1947. Pp. xx and 296. Illustrations 44. Price 42s.

THE postponed celebrations of the bicentenary of the Rotunda Hospital are worthily inaugurated by this history of the hospital, written by a former Assistant Master. It is a straightforward account of the hospital from its foundation by Bartholomew Mosse to the present day, and to a large extent the author allows the hospital records to speak for them-

## THE USE AND ABUSE OF REST

By THE LORD HORDER, G.C.V.O., M.D., F.R.C.P.

*Physician in Ordinary to H.M. The King; Consulting Physician, St. Bartholomew's Hospital.*

IN medicine two names stand out prominently in connexion with the advocacy of rest as a therapeutic agent—John Hilton in this country and Weir Mitchell in America. Hilton's lectures on "Rest and Pain" were delivered at Guy's Hospital during 1860-2; in 1874 Weir Mitchell "developed for a single seemingly hopeless case, literally at a woman's bedside, the treatment by seclusion, rest, massage, full feeding and electricity", which for many years carried his name, and told in lectures during 1875-7 what he had done. Both these pioneers were subjected to considerable criticism, each in his own day, and especially Weir Mitchell. This was an inevitable consequence of the promulgation of a new doctrine—new, it should be said, in its application, although admittedly old in its principle.

Modern criticism has shown more tolerance and at the same time more reason. An inflamed or injured part may be rested unduly long, with results that carry their own prejudice to the patient, and require their own special treatment. Hilton's gospel did not carry with it a warning of this nature; the disasters following the abuse of his doctrine proved to be object lessons after, and not during, the period of his participation in surgical teaching. In the meantime the abuse of Hilton's teaching led to a lamentable increase in the growth of the bone-setter's popularity. In any event, the abuse of a principle resulting from unawareness of the time factor and of the normal mechanism of tissue repair is in no sense a proper criticism of the principle itself. Certain developments have arisen, however, which lead us to modify Hilton's practice, though not his principle, stated as it was with such clarity and such moderation: "Rest is a most important therapeutic agent in the cure of accidents and surgical diseases".

In the case of injuries inflicted during operations, although these are to-day not less extensive than they were formerly, they are much less damaging to the tissues, both hæmorrhage and sepsis being under strict control; and the duration of operation can be prolonged with much less strain upon the essential organs (nervous, circulatory and respiratory) as the result of the present-day anæsthetist's knowledge and skill. Then, again, "pre-(operation) medication", including prophylaxis against shock by

# NOTES AND PREPARATIONS

## NEW PREPARATIONS

**HEPOVITE** is an enzyme hydrolysate of liver protein with natural vitamins and malt extract which has been prepared for use in the treatment of hypoproteinaemia, defective intestinal absorption and increased nitrogen excretion. It is presented in a dry granular form for oral administration. The product is not yet being issued for sale generally, but is offered to hospitals and clinics for controlled clinical trials. The manufacturers are Evans Medical Supplies Ltd., Speke, Liverpool 19.

**MIADONE** (*dl*-2-dimethylamino-4 : 4-diphenylheptane-2-one hydrochloride (amidone)) is a new synthetic analgesic, for oral or parenteral administration, which is said to have analgesic properties comparable with those of morphine without undesirable side-effects or production of tolerance to the drug. Issue is at present limited to clinical trial. Information can be obtained from the manufacturers, Burroughs Wellcome & Co., 12 Red Lion Square, London, W.C.1.

"**BENERVA**" vitamin B<sub>1</sub> tablets are now being issued in strengths of 10 and 25 mgm. aneurine hydrochloride per tablet. The manufacturers are Roche Products Ltd., Broadwater Road, Welwyn Garden City, Herts.

## N.A.P.T.

THE Annual Report of the National Association for the Prevention of Tuberculosis 1946-47, entitled "The Story of Tuberculosis", gives a history of the growth of the anti-tuberculosis scheme from its inception in 1887. This year the Association celebrates its diamond jubilee, and an account of its widespread activities will be found in the Report, a copy of which can be obtained from the Secretary of the Association, Tavistock House North, London, W.C.1. Six Colonial Scholarships are being offered by the N.A.P.T. through the Colonial Office to young men and women wishing to specialize in tuberculosis work with the object of carrying the knowledge gained into the colonial territories where they will work: two are open to registered doctors in the Colonial Medical Service; two to medical graduates of native medical schools in the British Colonies, and two to matrons, nurses, health visitors or other members of Colonial Sanitary Departments. Applications should be made through the Colonial Medical Departments for forwarding to the Colonial Office.

## THE ROYAL MEDICAL BENEVOLENT FUND

At the one hundred and eleventh Annual General Meeting of the Royal Medical Benevolent Fund, held at the Medical Society of London on June 5, Sir Alfred Webb-Johnson Bt., K.C.V.O., C.B.E., D.S.O., F.R.C.S., was elected President to fill the place of the late Sir Arnold Lawson, K.B.E., M.D., F.R.C.S., whose death occurred early this year. Among the points stressed by the Chairman of the Committee of Management was the need for further support for the completion of arrangements at Westmoreland Lodge, the residence for elderly ladies which is now in the process of being established, and which it is hoped will be the first of similar establishments for beneficiaries of both sexes. Contributions, legacies or gifts should be made payable to the Royal Medical Benevolent Fund, clearly marked "Westmoreland Lodge". The Address is 1 Balliol House, Manor Fields, Putney, London, S.W.1.

## MEDICAL PUBLISHERS CATALOGUES

"MEDICAL BOOKS, 1947", E. & S. Livingstone's catalogue of medical and scientific books has just been published, and a copy will be sent post free on application to 16 and 17 Teviot Place, Edinburgh. "1947 Catalogue of Medical and Scientific Books", published by Wm. Heinemann (Medical Books) Ltd., is also available and can be obtained on application to the publishers, 100 Great Russell Street, London, W.C.1.

## THE GREAT ORMOND STREET HOSPITAL FOR SICK CHILDREN

THE Board of Management of the Hospital for Sick Children, Great Ormond Street, London, W.C.1, have decided, in an endeavour to lessen the time spent waiting in the Out-Patient Department, that out-patients will be seen by members of the consulting staff only by appointment, which should be made if possible by the doctor acquainted with the case, and preferably by letter. Patients will be seen by appointment between 9.30 a.m. and 12.30 p.m., except on Sundays; those attending without introductions will be referred to a member of the consulting medical or surgical staff only if necessary after examination in the receiving room. The Hospital is open day and night for urgent cases.

The contents for the August issue, which will contain a symposium on "Convalescence", will be found on page lxxv at the end of the advertisement section.

rest! Electricity and massage have both been relegated to special cases, and with "over-feeding" made selective the original "rest cure" of Weir Mitchell has passed out of the therapeutic field. Almost one feels that Weir Mitchell himself would not be surprised if he knew about this, for he recognized clearly that "therapeutics is subject to maladies, epidemic and endemic".

#### THE MODERN USE OF REST

So much for the abuse of rest. For its use many of the old indications remain, and, Nature's processes of repair being largely fixed, must always remain. In these, Nature can be greatly helped but never hustled. There is no royal road by which rest can be escaped in treating the child or adolescent with an inflamed heart or kidney, the early case of pulmonary tuberculosis or the tuberculous peritoneum which is not amenable to surgical help. He who tries to save time here will probably lose it, and may lose his patient too. On methods of resting special organs rather than, or in addition to, the patient—collapse therapy in pulmonary tuberculosis, the use of silence or the whispered voice in tuberculosis of the larynx, a special dietary in liver disease, reduction of weight in "fatty heart"—space forbids a digression.

In the treatment of emotional stresses and other forms of mental trouble, given that the main indication is rest, three essentials should be borne in mind: a careful study of the individual so as to get to know what *is* rest to him or to her, pains to find how and where the remedy can be dispensed, and training the patient in "progressive relaxation".

(1) *The individual patient.*—In the majority of cases the main objective is "neither listlessness nor mad endeavour". But in between these extremes the likes and dislikes of each person should be known and allowed for. The last thing to assume is that what the doctor would find restful the patient would also. Is it quiet or noise? The cinema frequently or not at all? Blackpool or Dartmoor? Frankness is all.

(2) *Dispensing the remedy.*—It is not enough to say to the patient "you must get more rest". The how and the where must be gone into. The whole of his domestic economy must be passed in review if the doctor wants to be of real help. This means time and thought, but the help is proportionate to the expenditure of these.

(3) *How to rest.*—This does not come by instinct. If it did, the patient would not so often require it. Indeed, training in relaxation might be regarded as prophylactic treatment against the "nervous breakdown" for which rest is so often prescribed. Call it "meditation", "yogi", "the quiet hour", or what you will, it has a hygienic value that goes back at least to Marcus Aurelius, and the value is both spiritual and physical. If now, for lack of this habit, the hot and chafing mind, dragging its "tired" body with it, needs rest, the doctor must give the necessary instruction, even demonstration, and must follow up his teaching by frequent contacts so that he



sedation, by transfusion and by prevention of infection, is another time-saving factor.

The Trueta method of dealing with wounds on the battlefield (and behind it) undoubtedly has been a time-saving device so far as our present consideration is concerned. In obstetrics there are probably analagous experiences to some of those just mentioned, to which reference will be made in this symposium. Be the reasons as they may, experience, the final test of any method, has justified the modern surgeon's ability to shorten the post-operative period in many directions.

"Rehabilitation" in its widest sense has made a large contribution to a scientific assessment of the need for, and employment of, rest periods both in the medical and in the surgical fields. Originally a concept based upon economic grounds it has pervaded the physiological and psychological spheres and has proved of great value in the hands of thinking and trained physicians and surgeons.

Weir Mitchell lived to deal with much more trenchant criticism than did Hilton, especially from the French school of therapeutists. When Dubois commented that he "found that the monotonous occupation of running an electrode over a patient's body was a bore" and "soon perceived that a little philosophic counsel was more precious than half an hour's Faradization" he was heralding the time when the psychiatrist realized that to leave the patient's mind in a state of vacuity or, more correctly and more often, struggling without guidance with the obsession which was largely the cause of her trouble, he was wasting a good opportunity for psychotherapy. For a while the pioneer was well able to hold his own, though not by poking fun at Lourdes and Mrs. Eddy (just then arrived), nor even by dismissing Janet's "disassociated personalities". He did it by a frank avowal of honest scepticism and by a warning which would not be altogether out of place to-day:—

"My protest . . . is not against mental treatment but only against exaggerated statements of what is to be obtained from its use. . . . the self-importance conferred by the belief of the disciples of some of the cults of mind healing that they are in possession of powers which lift them above their fellows is one of the bribes which fosters these perilous ereeds. Is there not risk that occasional brilliant results may lead to the adoption of the general and exclusive psychic treatment? The man who sees at his order sleep come, the headache of years vanish, aphonia disappear, must be better self-guarded than some men if, feeling the sense of power, he quite escapes the moral danger of this tempting contribution to intellectual vanity".

The sure and acknowledged place which psychotherapy has achieved in the treatment of the neuroses and the minor psychoses since Weir Mitchell's time has displaced the isolation which was a prominent part of his system, so prominent, indeed, that it was not uncommon to see "quietness grown sick of rest" replaced by despair, a worse state than mere boredom. Psychotherapy has moved a long way from this position, for neither convulsion therapy nor leucotomy can be regarded as expressions of the principle of

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may be assured that the instruction is understood and observed. Throughout all this the doctor's attention must be equally divided between the patient's body and his mind, between the spasm at his pylorus or in his colon and the spasm in his mind. In this way only can rest achieve its full and proper purpose.

#### THE "PSYCHOSOMATIC" CONCEPT

There is nothing new in this. Plato puts words into the mouth of Socrates which show the recent introduction of the term "psychosomatic" to be entirely redundant. All disease is psychosomatic and a system of therapy which ignores this primary principle in pathology deals with a part of the disease only. "There is no cure for the body apart from the mind", says Socrates, "first, then, and above all, the mind must be treated if the head and the rest of the body are ever to be made whole . . . Just here the mistake is made in regard to men: they attempt to treat the body independently of the mind".

This being so, time spent by the doctor in cultivating in his patient "the hygiene of a quiet mind" is far from time wasted. Of no less value is training in the release of nerve tension in various parts of the body wherever these can be brought under control; and the extent and degree of this control can only be found out by practice, preferably under skilled guidance. When spasms and tics, and faulty stance and pose, have been corrected the "anxiety state", which itself contributed to these, is lessened. That seemingly quaint thesis of William James, that we are happy because we smile rather than we smile because we are happy, had a "psychosomatic" truth in it! I was once challenged by a patient, whom I was trying to reassure by a recital of what was *not* the matter, with the question, "then what *is* the matter with me, doctor?" My eureka-like answer repeated James's concept: "It's your *face*", I said, "break up that face and you will begin to feel better"—and she did.

# POST-OPERATIVE CONVALESCENCE

By HEDLEY ATKINS, D.M., M.Ch., F.R.C.S.

*Director of the Surgical Department, Guy's Hospital.*

"THERE is wisdom in this beyond the rules of physic; a man's own observation, what he finds good of, and what he finds hurt of, is the best physic to preserve health" (Francis Bacon); or, as George Robey put it somewhat more succinctly three hundred years later: "A little of what you fancy does you good!" The instincts of the sick patient are not lightly to be disregarded, and the instincts of a patient recovering from an operation are those of a wounded animal, verging on the infallible. It is therefore necessary to plan the post-operative course, not upon fixed rules, but by interpreting and giving effect to the patient's needs.

When a patient returns to bed after an operation he is laid on his side, and a watchful nurse sits in attendance. She sees that breathing is unobstructed, removes the airway, if this has been left in, as returning consciousness soon renders this both irksome and unnecessary; prevents the patient from hurting himself; attends to the vomit and observes the pulse. During the restless stage of recovery the patient receives  $\frac{1}{4}$  grain (16 mgm.) of morphine and he is allowed to sleep off the effects of the operation. Some hours later the problems of convalescence begin.

## POSITION IN BED

*The Fowler position.*—On March 1, 1900, George Ryerson Fowler read a paper before the Brooklyn Surgical Society advocating the raising of the head of the bed by fifteen inches in cases of peritonitis in order to localize infected material to the pelvis. Mayo Robson and Moynihan in this country elaborated this idea, and propped such patients up with pillows so that the trunk was at an angle of  $70^{\circ}$  to the bed and he was supported by means of a "donkey" under the knees. This came to be known as "the Fowler position" and its use was extended, not only to cases of peritonitis, but virtually to all patients in the post-operative phase who could be so positioned without danger. In 1946, Spalding astounded the surgical world by a wholesale condemnation of the Fowler position, and opinion has hardly had time to settle after the shock it received.

The Fowler position was originally introduced in order to localize intraperitoneal fluids to the pelvis and it had no other purpose. Since then, however, its advocates have claimed that it allows better ventilation of the lungs, an unembarrassed action of the heart and more physiological function of the digestive tract. But we must observe that the maintenance of the Fowler position requires constant supervision, otherwise the patient "slumps"; it is not in fact the position which the patient instinctively chooses, he tries to wriggle down into bed and if we are going to take steps to counteract his instincts, we must be very sure of our ground.

First let us consider the question of localization of peritoneal exudate to the pelvis. Although it is allowed that for fluids and soluble toxins the pelvic peritoneum is equally as absorptive as the rest of the peritoneum, and toxæmia therefore is as severe with pelvic collections as with collections elsewhere, nevertheless, the aim is to localize pus so far as possible to the pelvis because pelvic abscesses are easy to deal with, whereas abscesses under the diaphragm are a source of great anxiety. Does the Fowler position help to do this? The forces governing the movement of fluids within the peritoneal cavity are threefold: gravity, capillary attraction, and differential pressure. Spalding has shown convincingly that gravity is the least important of these, at least when the peritoneal cavity is not exposed to atmospheric pressure. The peritoneal cavity is exposed to atmospheric pressure only for a short while after a drainage tube has been inserted and before adhesions have formed, and for these few hours gravity is an effective force. Capillary attraction plays some part, but by far the greatest part is played by differential pressure, fluid tending to move from areas of high pressure to areas of low pressure. Whenever a patient breathes out, the diaphragm rises and draws up the liver in its wake causing an area of low pressure in the potential space between it and the liver. This region of low pressure attracts fluid to it, and there is on this account a tendency for fluids to collect in the subphrenic space whatever position is assumed in bed. If, however, the patient is propped up, the weight of the liver increases the negative pressure in the subphrenic space and increases the positive pressure elsewhere, so that this tendency for fluid to be sucked into the subphrenic space is considerably enhanced, and we are forced to the conclusion that the Fowler position does not in fact tend to localize intraperitoneal collections in the lower part of the peritoneal cavity.

In regard to the other advantages claimed for the Fowler position, it must be conceded that the patient with heart failure breathes more easily when propped up so that the bulk of the liver is not lying against the heart, but in other than cardiac patients the respiratory excursion is not much affected by position, and if the patient is allowed to lie down in bed he will turn first on one side and then on the other, and secure far more adequate gravity drainage for the bases of his lungs than if propped upright and maintained in one position. It is in fact the added freedom of movement when lying flat which is the great argument against the Fowler position. Movement is essential to maintain an adequate circulation rate, particularly in the veins of the calf muscles where post-operative thrombosis arises, and this movement is only possible when the patient is accorded what Rowlands used to describe as "the freedom of the bed". Therefore at all stages in convalescence the patient should be allowed to assume in bed that position which he finds most comfortable. When he feels ill and wishes to lie down let him do so, but encourage him to turn over or, if too ill to turn himself, have him turned over in order to help drainage from the lungs and to prevent bed-sores. As he becomes able to feed himself and as he seeks to

read and to write, prop him up so that he is able to do so. In this way we are at least serving the patient's needs and not merely obeying "laws" which may turn out to be delusions within half a century.

### FLUIDS

"Too much of water hast thou, poor Ophelia." *Hamlet*.

Relatively recently in geological history, we may suppose, the ancestors of mankind heaved themselves out of the warm water which was their home into the vaporous swamps alongside. By some miracle of metamorphosis they acquired the propensity of extracting oxygen from the air and forever rid themselves of the trammels of the ocean bed. While changing an aqueous external environment for a gaseous one, the internal environment, as Claude Bernard originally called it, remained unchanged; and, in order to survive, the cells of the body need to be bathed in fluid. The fluid requirements of the human body vary with age, sex, build and climate, but it would not be far wrong to say that the adult requires between 4 and 6 pints in the twenty-four hours, a child of ten, 3 pints, and younger children proportionately less. In disease, more fluid may be required because more fluid is being lost, from the stomach, into dilated coils of intestine, from drainage tubes or from the overheated skin, so that as much as 8 to 10 pints may be necessary to replace it. A patient who is receiving too little fluid feels thirsty, has a dry tongue, and is passing less than 40 ounces of concentrated urine in the twenty-four hours; a patient who is receiving too much has œdema of the tissues and moist râles at the bases of the lungs. It is our clinical pride to steer him safely between the Scylla of dehydration and the Charybdis of satiety.

*Methods of administration.*—Fluid may be given to a patient by the mouth, by the rectum, into a vein and by other routes, less often employed, such as the sternal marrow and the subcutaneous tissues. The following table reproduced from "After-Treatment" (Atkins, 1942) gives the indications and contraindications for the three main routes:—

Route	Indications	Contraindications
THE MOUTH	Whenever possible	Unconsciousness. Vomiting; acute gastric dilatation; paralytic ileus; when vital fluids (blood, plasma, serum) are required
THE RECTUM	Unconsciousness; vomiting; for short periods (up to 48 hours)	Acute gastric dilatation; peritonitis; paralytic ileus; low colonic anastomosis; when vital fluids (blood, plasma, serum) are required
INTRAVENOUS	Acute gastric dilatation; peritonitis; paralytic ileus; low colonic anastomosis; when vital fluids (blood, plasma, serum) are required	Pulmonary œdema

*Choice of fluid.*—What fluid shall we give to the patient? The answer is, what he would fancy, unless there are indications for some special fluid,

ceases after twelve hours, to mechanical obstruction after an operation on the gastro-intestinal tract, to paralytic ileus, acute gastric dilatation, uræmia, or raised intracranial pressure. To the discerning clinician the cause will not long remain obscure, but whatever the reason it is salutary to keep the stomach empty until the primary disability has been overcome.

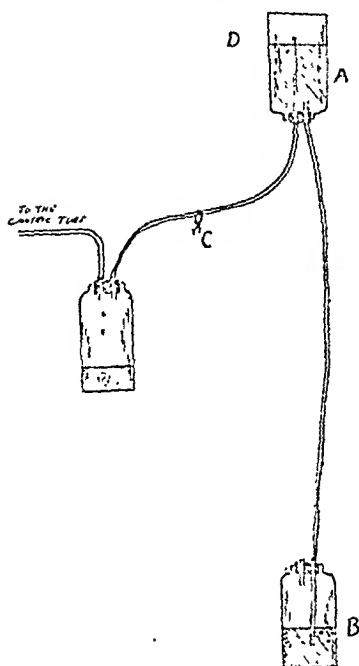


FIG. 1.—Gastric suction apparatus. As soon as bottle A is empty, the tube is clipped off at C, and bottles A and B are interchanged. The end of the glass tube at D must be above the fluid level.

kept. A chart is not a conglomeration of figures on many pieces of paper, however carefully this may have been compiled, but is a graphic representation indicating clearly, day by day, comparative as well as absolute quantities. Only a chart will show satisfactorily the gradual diminution of gastric residue and increase of daily urinary excretion betokening recovery in a case of paralytic ileus, and the most satisfactory chart is that incorporated with the temperature record. The progress of the case is seen at a glance, nor is there fruitless argument over addition and subtraction (fig. 2).

Gastric suction is therefore employed in every case of persistent vomiting from whatever cause; it has rendered obsolete the use of drops of iodine and drops of prussic acid or the assumption of grotesque posture; it is the keystone of treatment for many of those conditions of which vomiting is the symptom; and it has saved the patient for ever from the nauseating misery of the vomit bowl.

*Urinary excretion.*—After operations, particularly after operations in the region of the pelvis, there may be difficulty in voiding urine. No concern need be felt on this score for eighteen to twenty-four hours, provided the

If the cause is thought to be mechanical, aggravated perhaps by œdema at the suture line or partial ileus, gastric suction is maintained for three or four days, by which time the aggravating factor may be assumed to have settled. The tube is then clipped off and the patient takes fluid by the mouth. If the tendency to vomit is still present as evidenced by the aspiration of large quantities of fluid from the stomach after the tube has been clipped off for six hours, then suction is started again and a further trial made later. In such cases an exploratory operation may be necessary eventually to relieve the obstruction.

In *paralytic ileus* and *acute gastric dilatation* the signal for testing the power of the stomach to evacuate its contents normally is the return of peristaltic sounds to the abdomen. A successful issue to this test is an indication for removing the stomach tube and giving fluids by the mouth.

*Gastric suction* implies that the fluid requirements are maintained parenterally and in these cases a fluid chart must be

bladder was emptied just before the operation. After this interval of time, if the fluid intake is adequate, the bladder will be becoming distended and

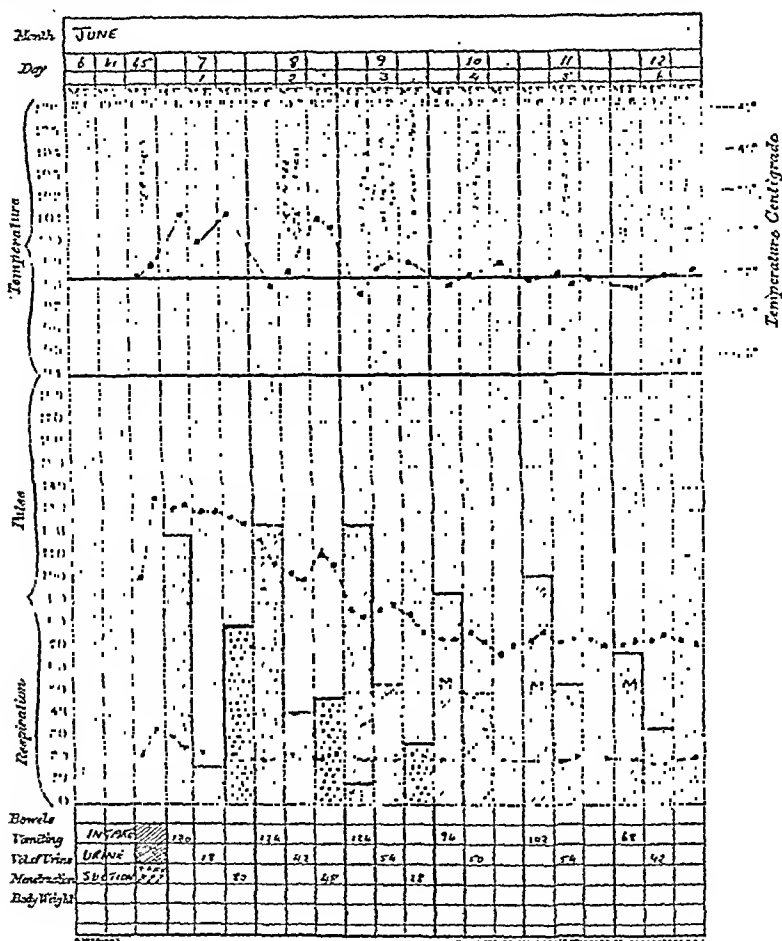


FIG. 2

unless it is emptied damage may occur to the wall through over-stretching. Every inducement should be offered to the patient to enable him to pass water naturally: bandages may be loosened and, after almost any operation, he may be allowed at this time to stand supported by the side of the bed while he attempts to micturate. If these means are unavailing he should be given 1 c.cm. of an antispasmodic, such as doryl or carbachol, subcutaneously, followed if required by an enema. Finally it may be necessary to pass a catheter.

**The bowels.**—Although it is the fashion nowadays not to bother about getting the bowels open after an operation provided there is a passage of flatus and adequate intestinal movement, there is no doubt that a proper





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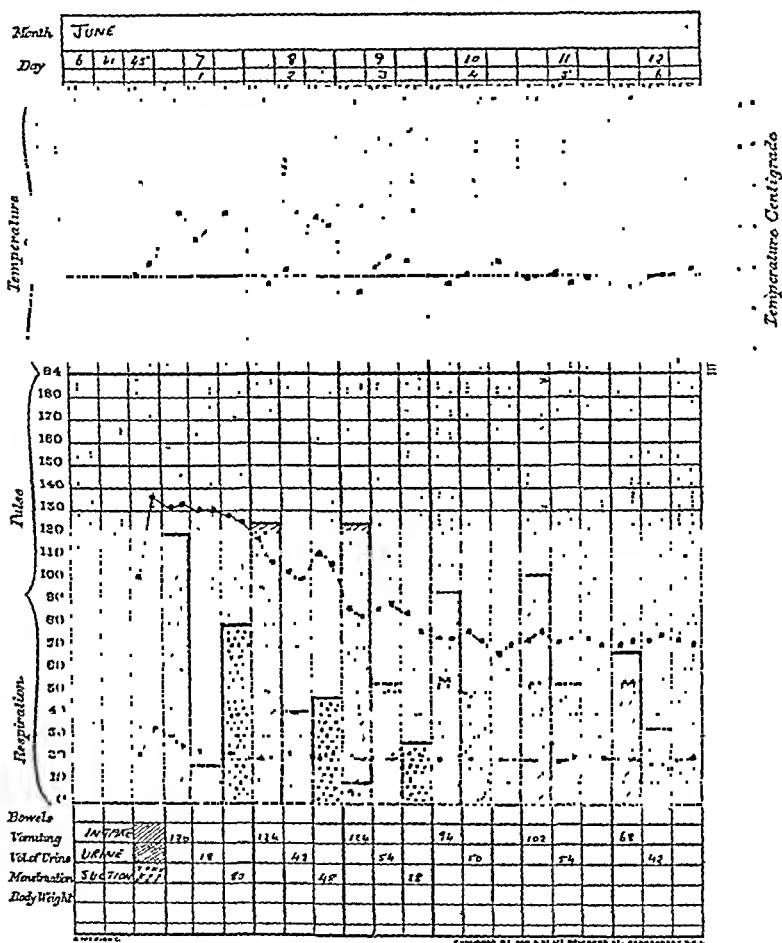


FIG. 2

unless it is emptied damage may occur to the wall through over-stretching. Every inducement should be offered to the patient to enable him to pass water naturally: bandages may be loosened and, after almost any operation, he may be allowed at this time to stand supported by the side of the bed while he attempts to micturate. If these means are unavailing he should be given 1 c.cm. of an antispasmodic, such as doryl or carbachol, subcutaneously, followed if required by an enema. Finally it may be necessary to pass a catheter.

*The bowels.*—Although it is the fashion nowadays not to bother about getting the bowels open after an operation provided there is a passage of flatus and adequate intestinal movement, there is no doubt that a proper

ceases after twelve hours, to mechanical obstruction after an operation on the gastro-intestinal tract, to paralytic ileus, acute gastric dilatation, uræmia,

or raised intracranial pressure. To the discerning clinician the cause will not long remain obscure, but whatever the reason it is salutary to keep the stomach empty until the primary disability has been overcome.

If the cause is thought to be mechanical, aggravated perhaps by œdema at the suture line or partial ileus, gastric suction is maintained for three or four days, by which time the aggravating factor may be assumed to have settled. The tube is then clipped off and the patient takes fluid by the mouth. If the tendency to vomit is still present as evidenced by the aspiration of large quantities of fluid from the stomach after the tube has been clipped off for six hours, then suction is started again and a further trial made later. In such cases an exploratory operation may be necessary eventually to relieve the obstruction.

In *paralytic ileus* and *acute gastric dilatation* the signal for testing the power of the stomach to evacuate its contents normally is the return of peristaltic sounds to the abdomen. A successful issue to this test is an indication for removing the stomach tube and giving fluids by the mouth.

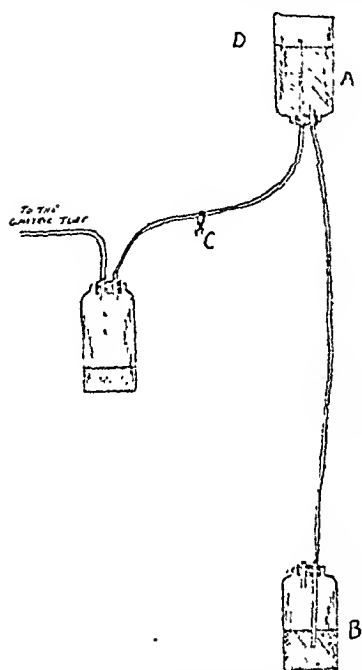
*Gastric suction* implies that the fluid requirements are maintained parenterally and in these cases a fluid chart must be

FIG. 1.—Gastric suction apparatus. As soon as bottle A is empty, the tube is clipped off at C, and bottles A and B are interchanged. The end of the glass tube at D must be above the fluid level.

kept. A chart is not a conglomeration of figures on many pieces of paper, however carefully this may have been compiled, but is a graphic representation indicating clearly, day by day, comparative as well as absolute quantities. Only a chart will show satisfactorily the gradual diminution of gastric residue and increase of daily urinary excretion betokening recovery in a case of paralytic ileus, and the most satisfactory chart is that incorporated with the temperature record. The progress of the case is seen at a glance, nor is there fruitless argument over addition and subtraction (fig. 2).

Gastric suction is therefore employed in every case of persistent vomiting from whatever cause; it has rendered obsolete the use of drops of iodine and drops of prussic acid or the assumption of grotesque posture; it is the keystone of treatment for many of those conditions of which vomiting is the symptom; and it has saved the patient for ever from the nauseating misery of the vomit bowl.

*Urinary excretion.*—After operations, particularly after operations in the region of the pelvis, there may be difficulty in voiding urine. No concern need be felt on this score for eighteen to twenty-four hours, provided the



bladder was emptied just before the operation. After this interval of time, if the fluid intake is adequate, the bladder will be becoming distended and

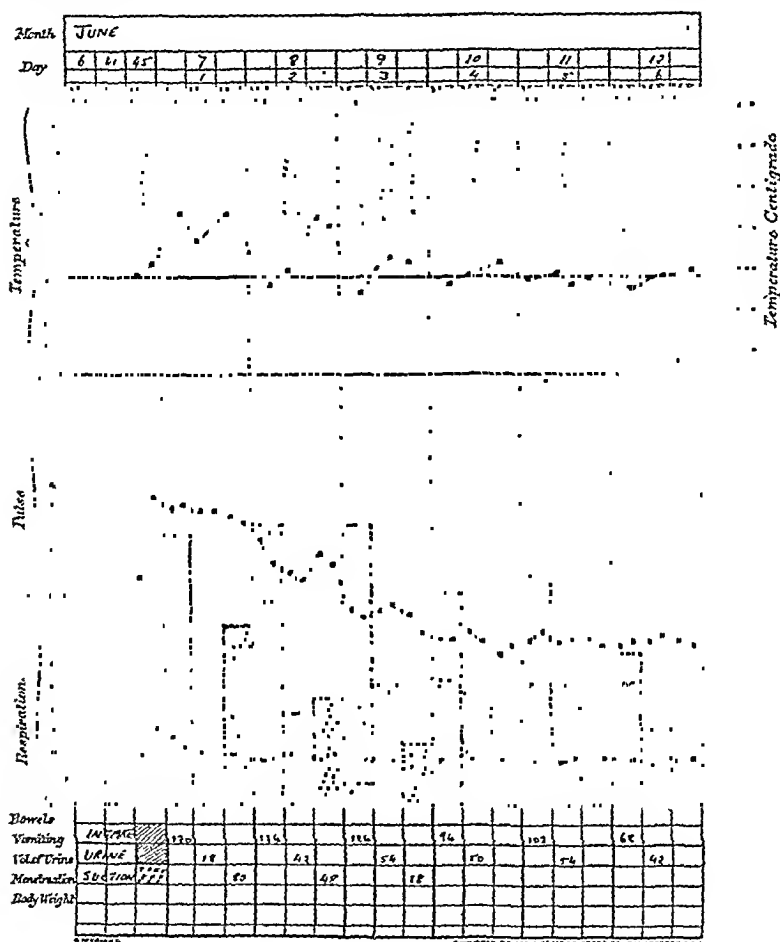


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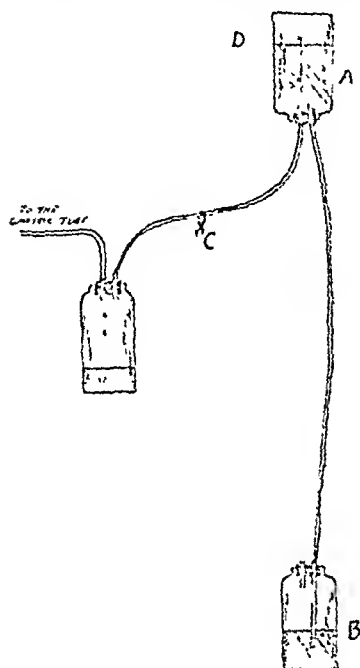


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# CONVALESCENCE IN CHILDHOOD

By W. S. CRAIG, M.D., F.R.C.P.Ed., M.R.C.P.

*Professor of Pædiatrics and Child Health, University of Leeds.*

COMMONLY, convalescence is defined as the restoration or recovery of health after illness or disease. Applied to children no such definition can be considered as complete. First and foremost childhood is the period of growth, and with physical growth there takes place mental, emotional and intellectual development. Nor is convalescence in childhood concerned merely with the restoration of health. It is equally concerned with the establishment of health on such a basis and in such circumstances that normal development in all its aspects will be favoured throughout the remainder of childhood. It follows that the long-term implications of convalescence are of even greater importance in childhood than in adult life. Convalescence may materially influence the prospects of a child entering adult life so equipped physically, mentally and intellectually that he can earn his livelihood and play his part in society as a useful citizen.

The circumstances in which children require convalescent care vary greatly. With children, as with adults, convalescence is often required after a sharp, acute illness, such as primary pneumonia or acute nephritis. It is especially valuable in preventing interference with subsequent healthy development in children who are recovering from illness of long duration or from an attack of some debilitating disease such as whooping-cough or measles. There are, however, other indications which are less easy to define, and many of which are more directly related to sociological, environmental, or even economic factors. Not a few children are admitted to hospital whose complaint is not one of organic disease but rather one of mental exhaustion or emotional repression attributable to home conditions or, less frequently, to circumstances of school life. Cases are frequently encountered in which there is some gross lack or error in the daily routine. The error may consist in lack of sleep or exercise under healthful conditions, in faulty nourishment, in excessive domestic drudgery or in the absence of loving understanding and companionship. The need of these children for convalescent care is, in its own way, as great as that of the child recovering from a physically exhausting disease.

## HISTORICAL

This wide conception of convalescence is not new. Although convalescent care of children has until recently attached first importance to physical requirements, the emotional and intellectual needs of the convalescing child have been recognized in one way or another for many years. It may be said that acceptance of the fact that these various needs should not be catered for separately represents the most recent advance in convalescent care of the child.

evacuation of the bowels has a wholesome effect upon the patient's well-being, and in ordinary circumstances the bowels should be emptied on the fourth morning after an operation. This is ordinarily effected by giving the patient a dose of cascara or vegetable laxative on the evening of the third post-operative day followed by an enema on the morning of the fourth. For the evacuation of faeces, and except in the desperately ill, the bed-pan should give way to the commode. For those patients in whom strain of the cardiovascular system is of no concern, the assumption of a physiological position in voiding faeces is a great advantage; for those who must avoid such strains there is much less involved in being helped on to a commode by the side of the bed than by writhing fruitlessly in opisthotonos on a bed-pan.

#### SLEEPING AND RISING

A patient who is in bed for the greater part of the day can do with less sleep than a normal man about his business. Furthermore he can sleep when he chooses, and if he wishes to read far into the night, provided it does not disturb others, he should be allowed to do so. Nevertheless, pain, discomfort, noise or a strange environment may prevent a patient who requires sleep from getting it, and most patients need some assistance in the post-operative period. A mixture containing 15 grains (1 gm.) of bromide and 15 grains (1 gm.) of chloral is a good standby; sodium amytal in 3-grain (0.2 gm.) doses can be given to those who require something stronger. Whatever is prescribed may be left at the patient's bedside for him to take when he feels inclined.

The exigencies of war and the need to conserve "man-hours" prompted many surgeons to try the effect of *early post-operative ambulation*, and what was initiated as a necessary expedient was found to be a desirable practice. Early rising diminishes the incidence of most vascular and pulmonary complications, speeds up recovery and reduces the period of convalescence. In some clinics, particularly in America, the pendulum has swung to the extreme and patients are got out of bed on the day of their operation, but this would seem unnecessarily cruel both to the patient's wound and to his spirit. After most operations a patient can get out of bed on the third post-operative day while his bed is being made, and thereafter for increasing periods. Patients who have had hernias repaired are no exception to this rule; if the repair is unsound on the third day it will be even more unsound in the third week. Nothing is gained by such patients lying in bed for three weeks and, by desperate and unnatural exercises, endeavouring to prevent the pot-bellied flabbiness inevitable after such a period of recumbency.

Finally, let us remember that kindness and sympathy are the corner-stones of therapy; that into that tireless devotion to our work which is taken for granted in our great profession, we must infuse a spark of charity and not only heal the body, but also rally the spirit.

#### References

- Atkins, H. J. B. (1942): "After-Treatment," Oxford.  
 Spalding, J. E. (1946): *Lancet*, i 643.

The early residential special school aimed at meeting the needs of children requiring treatment for some clearly defined form of handicap. Simultaneously, but independently, it came to be realized that among school children there were many who, although not ill, showed signs of varying degrees of debility. Open-air schools were developed with carefully planned curricula designed to allow for adequate relaxation and healthy exercise. Their success resulted in many voluntary organizations and local education authorities establishing both day and residential open-air schools for anæmic, delicate and rachitic children.

Common to all these measures for the welfare of the school child was the object of providing treatment under conditions which, at the same time as securing recovery, would promote subsequent healthy development, despite physical, environmental or economic handicap. Much the same objective gave rise to many of the services which to-day are concerned with the welfare of infants. The origins of the day nursery and the nursery school can be traced back to the kindergarten of last century. Both movements aim at providing small children with opportunities for play, relaxation, exercise, suitable meals, and elementary instruction in healthy surroundings. By doing so they promote physical and mental health and offset the harmful effects of an unsatisfactory home. They do in fact provide convalescent care, even though that care may be essentially anticipatory.

No review of the expansion of measures for convalescence would be complete without reference to the large-scale evacuation of city children during the past war. For many children, evacuation was their first experience of convalescence. They were provided with all that was necessary for healthy physical development in so far as environment, routine, nourishment and supervision were concerned. Of the many thousands of children evacuated there were few whose physical condition did not show obvious signs of improvement. On the other hand, a limited number of children never lost the sense of insecurity arising from separation from their homes. The results of evacuation clearly demonstrated two cardinal principles of successful convalescent care in childhood—the benefit to physical well-being and growth of a regulated life in healthful surroundings, and the necessity for considering emotional in conjunction with physical welfare.

#### GENERAL REQUIREMENTS

As has already been stated, the purpose of convalescent care is to restore normal health and to establish conditions which will maintain healthy development. It is important to plan the care of the convalescent child with the same care as that of the child with a disease. Planning involves recognition of the child's needs for many years. It may be said that the child's needs should not be catered to in a hygienic surroundings, fresh air, natural surroundings, rest, and graduated physical activities. D.



History records that there have always been those willing and anxious to succour the child in distress. In so far as they gave the destitute child physical protection, nourishment and emotional security the religious orders of the pre-reformation days provided certain of the essentials of convalescence. The same may be said of many of the philanthropists and charitable organizations of the 16th, 17th and 18th centuries.

In 1796 the Royal Sea Bathing Hospital was founded at Margate with the object of giving scrofulous London children the benefit of seaside conditions. Apart from this outstanding exception, attributable to John Lettsom, it was not until the 19th century, and more especially the latter half of the 19th century, that motives other than pure compassion prompted measures intended to provide children with facilities for convalescence. The early ragged schools aimed at providing vagrant children with clothing, education, occupation and spiritual guidance. With the coordination of these schools under what was later to become known as The Shaftesbury Society, arrangements were made for London children in poor circumstances to have holidays in the country. In the course of a few years similar organizations were established elsewhere with the same object. Simultaneously, in a number of cities, widespread but disjointed movements developed for the provision of meals for destitute children. This same period saw the establishment of the first children's hospitals and the founding of the larger and better known charitable organizations for homeless children. It was quickly realized that convalescent care was a necessary adjunct to the hospital treatment of the sick child and to the institutional care of the homeless child, and by the beginning of the 20th century many voluntary hospitals, some municipal hospitals and most of the larger charitable organizations for children developed their own convalescent annexes.

A feature of institutional convalescent care is that in general, as compared with hospital treatment, it involves longer separation of the child from his home surroundings. This is most in evidence in the homes established for crippled children. These homes have for many years provided convalescence in association with remedial therapy, and credit is due to them for many advances. Crippled children in hospital were given vocational training at the Sanderson Home, Gosforth, as long ago as 1889, and were first given teaching instruction in 1898, at the London Orthopædic Hospital. In the early years of the present century open-air nursing of crippled children was practised at Baschurch by Dame Agnes Hunt. In 1908, the first hospital for the pot-bellied type of non-pulmonary tuberculosis was established at Alton by

Finally, let us remember the first sanatorium school for cases of pulmonary of therapy; that into that at Stannington, Northumberland. At both these granted in our great professions included educational facilities. The principle only heal the body, but also mind and its most recent application is to be found in children with rheumatic heart disease, bronchi-

# CONVALESCENCE IN OBSTETRICS

By ANTHONY W. PURDIE, M.B., F.R.F.P.S., M.R.C.O.G.

*Obstetric Surgeon, North Middlesex County Hospital.*

DEATH in child-birth is now much less common than formerly, but a considerable amount of chronic invalidism still occurs, and relatively minor but distressing sequelæ are by no means rare. A woman who has had no antenatal care may have a satisfactory obstetrical convalescence, but pregnancy, labour, the puerperium, and the months or years that follow are a continuous process. Prevention of mishaps by intelligent anticipation is the key to satisfactory obstetrical practice. I make no apology therefore for including some remarks on antenatal supervision of pregnancy and on the conduct of labour. In his conduct of these the practitioner may make or mar his patient's convalescence.

## ANTENATAL ANTICIPATION

Antenatal care may break down in various ways, often through no fault of the patient. Perhaps one of the most common causes of this breakdown lies in the *frequency of the visits* which the patient is asked to make. Customarily she is seen at monthly intervals for the first 28 to 30 weeks of the pregnancy, then at fortnightly intervals until the 36th week, and at weekly intervals thereafter until the start of labour. These are the minimum attendances for efficient antenatal supervision while the pregnancy continues to be normal. The detection of an abnormality at one of these visits may call for more frequent consultations. Particularly is this so when one of the toxæmic manifestations is found. Yet when a woman with eclampsia or severe toxæmia is admitted to hospital, it is not uncommon to find that two or three weeks have elapsed since she was last seen by her doctor and that some œdema had been present then, together with a slight rise of blood pressure, or even a trace of albumin in the urine. Rest in bed at that stage with medical supervision might have avoided the disaster of eclampsia with its resultant prolonged convalescence in non-fatal cases.

*Anæmia* is common in pregnancy. The diagnosis of the type of anæmia and its appropriate treatment is a safeguard against harmful effects of the inevitable post-partum loss of blood. Œdema and albuminuria are sometimes found in severe anæmia. It is a serious error to mistake this for toxæmia.

*Heart disease.*—Pregnant women with mitral stenosis should be informed of the importance of the common cold. Neglected colds may lead to bronchitis and so to congestive failure, with an unnecessarily prolonged convalescence even in favourable cases.

*Selection of cases for hospital confinement.*—The elderly primigravida, especially if she has been married for a number of years, should be confined in hospital. Operative intervention is frequently required, and often in a

children who require a change of air, routine, companionship and surroundings for successful convalescence. This applies particularly to many of those suffering from such conditions as asthma, tuberculous infection, rheumatic infection, chronic pulmonary infections, nervous and post-operative debility. For such children provision is made in the form of convalescent homes, holiday homes, homes of recovery, long-stay hospitals, hospital schools, residential special schools and *præventoria*. The variety of names applied to these convalescent homes reflects the differing ways in which the present-day conception of convalescence in childhood has evolved; but it is also an indication of the existing lack of coordination of such provisions as do exist. As yet no large-scale attempt has been made to correlate supply with demand. The majority of homes are distributed in those parts of the country noted for their bracing sea or country air. Voluntary organizations and local authorities tend to compete indiscriminately for vacancies despite the fact that Invalid Children's Aid Associations give valuable service as clearing centres in some areas. The activities of these associations are, however, not coordinated and are concerned almost entirely with the needs of their own particular localities. This lack of coordination makes for a wasteful use of resources, which fall far short of requirements, and which are distributed in a way which takes little, if any, account of the needs of extensive parts of the country as a whole. Another aspect of this unsatisfactory state of affairs is that it contributes considerably to the difficulties of general hospitals providing treatment for sick children.

Difficulties and delays are experienced most frequently with children under five years of age, for whom only limited facilities for convalescence are available. The staffing of the small homes required for such children presents problems, and extended trial might be given to arrangements which enable a proportion of mothers to accompany young children sent away for convalescence.

#### FUTURE PLANNING

In conclusion, it may be said that despite the advances achieved by voluntary organizations and local authorities, and despite the fact that its importance in relation to certain specific clinical conditions has long been recognized, convalescent care in childhood does not yet have the importance attached to it which it deserves. The need remains to enlighten the public as to the true long-term purpose of convalescence in childhood; to make possible domiciliary convalescent care on a more extensive scale by improving housing conditions and bringing professional guidance to the home; to expand and coordinate residential provisions in relation to special and total requirements; and to impress upon the medical student, the student nurse and the social worker the far-reaching significance of convalescence in pædiatric care.

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*Weaning.*—It may be necessary to abolish the supply of milk. The administration of a synthetic oestrogen is now an established practice. With oral therapy the frequency of administration appears to be more important than the dosage used. Stilbæstrol, 5 mgm. four-hourly for three days, followed by 5 mgm. eight-hourly for another three days, will prevent the occurrence of lactation or will suppress it if it has been established. Parenteral administration of hexæstrol dipropionate (Prescott and Basden, 1944) is also satisfactory. A single intramuscular injection of 15 mgm. of this substance will inhibit lactation if given within three days of delivery, and a similar dose, perhaps requiring repetition, will suppress lactation after its establishment.

*Deficient lactation.*—There is no food or drug which has consistently a galactagogue effect. If a deficiency in the diet is made good the substance added to the diet may have a galactagogue effect in the case in question. Milk is an excellent food and is advocated as a galactagogue but it is rather dilute. A sufficient and well-balanced meal is as good or better from the lactogenic point of view. Fat is a common deficiency in the diet. A diet rich in fat appears to have a galactagogue effect. It may be recalled that women treated by a ketogenic diet for puerperal urinary infections frequently proved to be extremely good lactators. Such success as lactagol (composed largely of powdered extract of cotton seed) may have is probably due to its being additional fat. Prolactin has proved disappointing in the human female; it may encourage a failing milk supply. The dosage recommended by Kenny (1939) is 5 c.cm., 5 c.cm., 2 c.cm., 2 c.cm., and 1 c.cm., on successive days.

*Engorgement* of the breasts may be very painful on the third or fourth day after delivery. Stilbæstrol, 1 mgm. four-hourly for twenty-four hours, will give relief. Provided the baby sucks vigorously the milk supply will not be endangered. *Acute mastitis* frequently responds to the customary treatment of support in a position of elevation and the application of heat in the form of hot fomentations or kaolin poultices. Heat may be obtained from an electric lamp. The bulb should be shielded by a wire cage to prevent accidental burning of the breast. A blanket is draped over the lamp and the breast in order to conserve the heat. Penicillin may be given in addition. Hodgkinson and Nelson (1945) treated twenty-four cases without abscess formation in any case. They gave 25,000 units three-hourly for seventy-two hours, followed by 15,000 units three-hourly for a further forty-eight hours.

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Some claim that labour will be less painful, that its duration will be shortened, and that the incidence of operative delivery and of lacerations will be reduced if the patient practises antenatal exercises and becomes proficient in the art of relaxation. Rodway (1947), however, finds these of little or no value, but admits to infrequency of instruction and lack of supervision by a trained instructress. Doubtless for this very reason many patients perform equally useless postnatal exercises.

#### THE ABNORMAL PUERPERIUM

*Retention of urine.*—This tends to occur following spontaneous delivery when labour has been prolonged in women who have had perineal stitches, and in those who have had a forceps delivery of some difficulty. Simple remedies, such as alteration of position, getting out of bed, the sound of running water, 30 to 60 grains (2 to 4 gm.) of potassium citrate, 60 to 90 minims (3.6 to 5.4 c.cm.) of spirit of nitrous ether are often effective. Carbachol, 1 c.cm., may be given intramuscularly as a parasympathetic stimulant. Before this injection is given the patient should be seated on a bed-pan, as the desire to micturate evoked by the drug is fleeting. It is not so successful in puerperal as in post-operative cases (Moir, 1937). If these remedies fail to overcome the retention of urine, catheterization will be necessary. This should not require repetition in the first two types of case but may be necessary in the last.

Retention of urine with overflow is more deceptive. Here the patient complains of frequency. The nurse reports frequency. She seldom diagnoses retention of urine when there is overflow. After a difficult forceps delivery the practitioner should examine the patient's abdomen himself at each visit in the early puerperium. If not diagnosed the results of retention with overflow may be very serious. I have seen gangrenous cystitis caused by its neglect. Claye (1941) has reported a most instructive case which ended fatally. The treatment is simple if instituted early. A self-retaining catheter is inserted and the bladder is drained continuously for forty-eight hours. During this time a urinary antiseptic or a sulphonamide should be given. When the catheter is removed the patient will no longer have retention.

#### BREAST DISORDERS

*Cracked nipples* are fairly common in the early days of the puerperium. Provided strict cleanliness is observed I prefer in mild cases to keep the baby feeding at the breast. An anæsthetic ointment, e.g. nestosyl, is applied before the beginning of the feed. Penicillin cream may be incorporated in the ointment. The crack usually heals in a few days. When the crack is more troublesome the baby should not be permitted to feed at the breast for the next three days. The milk should be extracted with a breast pump and fed to the baby from a bottle. A still more troublesome crack may necessitate binding of the breasts for twenty-four or forty-eight hours after the crack

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Retention of urine with overflow is more deceptive. Here the patient complains of frequency. The nurse reports frequency. She seldom diagnoses retention of urine when there is overflow. After a difficult forceps delivery the practitioner should examine the patient's abdomen himself at each visit in the early puerperium. If not diagnosed the results of retention with overflow may be very serious. I have seen gangrenous cystitis caused by its neglect. Claye (1941) has reported a most instructive case which ended fatally. The treatment is simple if instituted early. A self-retaining catheter is inserted and the bladder is drained continuously for forty-eight hours. During this time a urinary antiseptic or a sulphonamide should be given. When the catheter is removed the patient will no longer have retention.

#### BREAST DISORDERS

*Cracked nipples* are fairly common in the early days of the puerperium. Provided strict cleanliness is observed I prefer in mild cases to keep the baby feeding at the breast. An anæsthetic ointment, e.g. nestosyl, is applied before the beginning of the feed. Penicillin cream may be incorporated in the ointment. The crack usually heals in a few days. When the crack is more troublesome the baby should not be permitted to feed at the breast for the next three days. The milk should be extracted with a breast pump and fed to the baby from a bottle. A still more troublesome crack may necessitate binding of the breasts for twenty-four or forty-eight hours after the crack

future pregnancy is wrong. It merely causes the patient great distress if she should become pregnant. If she really must not become pregnant again she should be sterilized. The most convenient time for the performing of this operation is about the tenth day of the puerperium.

*Six weeks after the confinement* the patient is examined again. Inquiry is directed to the patient's feeling of well-being, the duration of red lochia, the presence of white discharge, the degree of control over micturition and defaecation, and specific complaints such as backache or a bearing-down feeling. The blood pressure is taken, the urine examined, and a careful pelvic examination is made. A tendency to vaginal prolapse or stress incontinence of urine responds well at this stage to exercises of the Cyriax type which Browne (1946) describes in detail.

Uterine retroversion may have occurred since the end of the lying-in period. If this is so it should be corrected and a Hodge type of pessary inserted. This should be worn for about four to six months. A ring pessary may be more suitable if the perineum is deficient. Occasionally the correction to anteversion proves very painful. This can be overcome by brief pentothal anaesthesia. This step is worth while, for there is a tendency towards the improvement of genital prolapse while involution is still going on, and anteversion is the position of best mechanical advantage for this to take place in. But a young woman should not be condemned to wear a ring for years. If one year after confinement she has a prolapse which is causing symptoms, operation should be advised. To postpone operation, as is sometimes done, until after the menopause may be to inflict years of misery upon her. Child-birth following a repair operation is not a disaster: delivery can be allowed by the natural route. It does not follow that the prolapse will recur.

At this examination the cervix should be inspected. The erosion so commonly found, and so often predisposing to leucorrhœa or accompanying it, is easily and satisfactorily treated by superficial radial incisions with an electric cautery. This can be done in the consulting room and anaesthesia is quite unnecessary. The cauterization should be repeated at intervals of four to six weeks until the cervix is free from erosion. Even in the absence of leucorrhœa, if a cervical erosion is present it should be treated. There is evidence which suggests that this treatment may be a preventive measure against the future occurrence of cervical carcinoma. Many cases of leucorrhœa are cured by this treatment, but all cases of leucorrhœa are not due to a cervical erosion, even if that is present. The discharge should be examined for the presence of trichomonas, monilia and the gonococcus. Should either trichomonas or monilia be recovered, and the discharge persist in spite of appropriate treatment (e.g. stovarsol or picragol in the case of the former, or 1 per cent. aqueous gentian violet in the case of the latter), smears from the urethra, vagina and cervix should be examined repeatedly to exclude gonococcal infection.



*Pyrexia* in the puerperium may be due to any disease which causes a fever, but the diagnosis usually resolves itself into infection of the genital tract, of the urinary tract or of the breasts. Of breast disorders sufficient has been said. The common *urinary infection* is coliform in origin and usually responds to treatment with a sulphonamide. In the event of one sulphonamide failing to sterilize the urinary tract, sensitivity tests should be carried out with the various sulphonamides in common use against the causative organism. These may indicate which is the appropriate sulphonamide to administer. Radiological investigation of the urinary tract should be considered if the infection still proves persistent, as some underlying cause, such as a calculus, may be responsible. In all cases of pyrexia in the puerperium, irrespective of what the cause appears to be on clinical grounds, a high vaginal swab should be taken for aerobic and anaerobic culture. If this investigation is omitted, genital tract infection may be overlooked. The taking of the swab is simple. An antiseptic should not be used. If the swab has to be sent to the laboratory by post it should be taken in the late afternoon and dispatched by the evening post so that the minimum time will elapse between the collection of the specimen and its inoculation on to the culture medium. For the treatment of genital tract infection the reader is referred to the various obstetrical textbooks.

#### POSTNATAL EXAMINATIONS

*At the end of the lying-in period.*—About the tenth to fourteenth day the patient should be examined before passing from the practitioner's immediate care. A brief general examination is made, and a careful pelvic examination. In the latter the state of the perineum, the degree of laxity of the vaginal walls, the condition of the cervix, the degree of involution and the position of the uterus, and the presence or absence of palpable adnexal disease are observed. If the uterus is retroverted its position should be corrected and, provided that the perineum has not been sutured, a suitable ring pessary should be inserted. On no account, however, should the making of this examination be responsible for the breaking down of a well-sutured perineum. It is preferable to postpone correction of uterine retroversion until the next examination rather than allow this to happen. Advice should be given about continued cleanliness in breast feeding and care of the nipples, as breast abscess later is all too common.

The practitioner may consider that the patient should not become pregnant again—either temporarily or permanently. In the former event he should arrange for her to receive proper instruction in contraceptive technique. She should be told that if she does become pregnant accidentally she should report to him without delay. The case can be considered on its merits then. If, after consultation with a colleague, termination of the pregnancy is thought advisable it can be carried out very easily provided the pregnancy is of short duration. But stern unconditional forbidding of

# CLIMATE AND CONVALESCENCE

By SIR ADOLPHE ABRAHAMS, O.B.E., M.D., F.R.C.P.

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ALTHOUGH the science of climatology has aroused the interest of observers for many generations, the absence of an extensive literature mirrors the comparative apathy of the medical profession in regard to the scope and opportunities of climatotherapy. The subject has little if any examination value; a circumstance which inevitably influences the teachers of medicine whose practical application, moreover, will be embodied in the extent of the opportunities they themselves have enjoyed for travel and for residence in the localities they are called upon to recommend. But the modern tendency is only too often to advise complete rest and change, leaving the patient to work out the details for himself.

There is no reasonable doubt that climate can act as an efficient assistant to Nature and to drugs in many conditions of ill-health, and that an unsuitable resort may do much to retard recovery. At the same time it must be appreciated that the stereotyped details relating to climate may be overshadowed by a large number of associated factors. Change alone may be a potent factor in the amelioration of almost any and every deviation from health. There is often a stage in convalescence, a condition of staleness or stagnation, when any sort of change seems to suffice; one might even accept a change for the worse. Unmerited credit may well be accorded to the change of air when it is forgotten that the excitement of a journey, the change of food and of all the routine circumstances of living may provide a stimulus that can be appreciated only by an experienced practitioner who may choose a situation for its psychological rather than its physiological environment, especially when considering a patient's idiosyncrasies and peculiarities, his inclinations, tastes and prejudices.

## SOME ELEMENTARY CONSIDERATIONS

The climate of any place is the result of various complex geographical conditions. These comprise latitude, elevation, relationship to the adjacent sea, to rivers, lakes and marshes, to mountains and to forests; the nature of the subsoil, whether rock, dry porous ground such as sand, or more or less impermeable, such as clay or peat. On these factors conjointly depend the meteorological conditions, the barometric pressure, the temperature and its range, the amount of sunshine, of shelter and of cloud, the rainfall, the humidity and the strength and direction of prevailing winds. These may be applied in the generalization that to obtain full benefit from a climate as a therapeutic agent the air should be pure, that is, free from organic material; the humidity should be moderate; there should be plenty of bright sunshine without any excess of heat; the temperature should be equable, that is, free from extremes. There should be an absence of violent winds.

*Backache* is a common complaint. This should not be ascribed uncritically to any gynæcological abnormality which may be present. There may be slight vaginal laxity or a retroverted uterus. If so, the retroversion should be corrected and a suitable pessary inserted. If the backache is relieved while this is worn and recurs when it is removed (particularly if the patient does not know of its removal) the lesion may be the cause of the backache. Operative treatment *may* even be advisable. But much harm is still being done because patients are told when they complain of backache that their womb is twisted or lying back. However elementary or even distorted her conception of what this means, she is roused to indignation. It is an insult to her womanhood. It must and shall be put right. Hence she will wear an abominable ring for years or willingly submit to the most ill-advised operation if only whatever is wrong with her womb can be corrected thereby. Yet an entirely different type of lesion is usually responsible. That conditions such as sacro-iliac strain, subluxation of a lower lumbar vertebra, spondylolisthesis and osteoarthritis require consideration make cooperation with an orthopædic surgeon desirable. In a recent paper Burns and Young (1947) suggest that *persistent* backache following pregnancy may be due to protrusion of an intervertebral disc, the injury having occurred at parturition. Time is required for the evaluation of new matter. It is to be hoped that our patients having escaped from a gynæcological Seylla will not fall into an orthopædic Charybdis.

Frequent and excessive menstruation can be very troublesome after child-birth. Its etiology is not clear. Curettage is not very helpful. Adequate iron therapy is essential to combat the resultant anæmia. Although it may take months or perhaps even several years, menstruation is likely eventually to return to normal. This should be impressed upon the young subject. In older women an artificial menopause may be induced with radium or deep X-rays or, alternatively, hysterectomy may be performed.

### References

- Browne, F. J. (1946): "Antenatal and Postnatal Care," 6th edition, London, p. 620.  
 Burns, B. H., and Young, R. H. (1947): *Lancet*, i, 624.  
 Claye, A. M. (1941): *J. Obst. Gynæc.*, 48, 235.  
 Fraser, D. B. (1944): *Brit. med. J.*, i, 523.  
 Hodgkinson, C. P., and Nelson, R. E. (1945): *J. Amer. med. Ass.*, 129, 269.  
 Kenny, M., *et al.* (1939): *Lancet*, ii, 828.  
 Malpas, P. (1944): *Brit. med. J.*, i, 590.  
 Moir, C. (1937): *Lancet*, i, 261.  
 Prescott, F., and Basden, M. (1944): *Brit. med. J.*, ii, 428.  
 Randell, M. (1945): "Training for Childbirth," London.  
 Rodway, H. E. (1947): *J. Obst. Gynæc.*, 54, 77.

find the circumscribed environment and the absence of distractions and diversions boring to a dangerous degree. Again, the conditions of debility and nervous exhaustion for which sea air is often so useful may in some subjects be aggravated, and insomnia in particular may be troublesome. Digestive disturbances seem to indicate that some people have an idiosyncrasy in this respect. In effect, for many convalescents a prolonged sea trip has great benefits; for some it is the very best prescription; for others, the very worst. Special care is demanded in the case of a patient debilitated from a very grave illness to ensure that adequate convenience for appropriate nursing can be guaranteed. Some ships have been constructed and furnished with such requirements in mind and partake of the character of ocean sanatoria, but these are exceptional and at the present day are probably non-existent.

In a similar way, but naturally to a lesser extent, one appreciates the advantages of the seaside. Although there is a striking contrast between the East and West Coasts, the former justly credited with tonic properties, the latter more sedative, we can in general accept the qualities of mountain air on a less stimulating scale and better suited to the nervous and excitable and those suffering from insomnia. The element of idiosyncrasy to sea air has been mentioned. Great variability of climate is found in the various seaside health resorts so that both bracing and sedative selections may be made. In addition, there is great variability in the character of towns, and the very features which in a fashionable resort may make a strong appeal to the convalescent in search of stimulation will receive the strongest condemnation from one who is in need of rest and tranquillity. The most bracing situations in England are in the South: the Isle of Thanet, all the way up the East Coast and to a lesser extent the West Coast, where Aberystwyth, Rhyl and Blackpool are favoured by the presence of Ireland on the westward side. Although individual requirements demand individual considerations, in general the following may be enumerated among bracing situations at different times of the year:—

In the Spring: Cheltenham, Kent, Sussex and Hampshire coast towns, Rhyl, Blackpool.

In the Summer: Thanet, Harrogate, Tunbridge Wells, the East Anglian Coast.

In the Autumn: Buxton, Cromer, Weston-Super-Mare.

In the Winter: Felixstowe, Thanet, Brighton, Bournemouth.

*A sedative climate* is, on the other hand, low-lying and sheltered from wind, with relatively high humidity and its attendant equability of temperature and liability to mist. Incidentally it may be added that any claim of a resort to dryness and equability of temperature must be unwarranted since these qualities are mutually exclusive. Indeed it may be maintained that humidity is often the most important of all climatic factors that have to be considered when making a choice for a delicate convalescent. A sedative resort must inevitably have a comparatively heavy rainfall and relatively little sunshine. Protection from the wind is also of prime importance, and

range of temperature without being too hot, low relative humidity, a fair share of cool dry wind. With such criteria one thinks first of mountain air with all its advantages. Purity is provided by relative sparseness of the population and the absence of factories. Actinic light has bactericidal action of considerable benefit in cases of sepsis with retarded or sluggish healing. The oxygen deficiency stimulates a greater production of hæmoglobin. There is encouragement towards increased exercise, improvement in appetite, digestion, general nutrition and muscular strength; all contributing to enhanced resistance to disease. Increased depth and frequency of respiration result in chest expansion, so that the reputation of Alpine resorts in suitable stages of pulmonary tuberculosis is well founded. It is of course implicit in such circumstances that a considerable amount of time can be spent in the open air.

Great Britain can hardly be said to possess any conspicuous mountains. The highest, Ben Nevis in Scotland, 4,406 feet; Snowdon in Wales, 3,560 feet; Carrantuohill in Ireland, 3,414 feet, and Scafell Pike in England, 3,210 feet, compare unfavourably with the giants of Switzerland. Quite apart from the question of altitude they are scarcely sufficiently dry and sunny and free from wind to be regarded as of similar therapeutic value to the convalescent. In fact, places like the borders of Dartmoor and others at a slightly lower level provide better opportunities in the summer months, and indeed since these are not surrounded by higher hills they may be more bracing than places in Southern Europe at three or four times their elevation. For protracted residence in mountain air—a requirement of particular value in convalescing from pulmonary diseases and for the tuberculous—foreign mountain resorts are in every way desirable. There are, it is true, contraindications: some people are peculiarly susceptible to diminished oxygen tension although the various disturbances described as “mountain sickness” are often more correctly attributable to all sorts of factors, attention to which permits of an adjustment suggesting that the convenient ready-made explanation of altitude is unjustifiable. There are, however, certain definite contraindications, such as cardiovascular disease, renal disease, a high degree of emphysema. Delicate, very young or aged convalescents as a rule should not be sent to bracing resorts.

A *marine climate* provides in a high degree the essentials comprehended as bracing and is best represented in an ocean voyage. But such a prescription must be given with discretion in recalling all the circumstances involved. As somebody has cynically expressed it, “if the right sort of ship could be sent to the right place in the right sort of weather with the right sort of patients a great deal of good might result”. We cannot ensure all the advantages without accepting the disadvantages. The convalescent who is in need of complete rest, and the nervous type for whom isolation and freedom from mental activity are desirable, may find such requirements *in excelsis* even if it be admitted that through the installation of wireless complete isolation is nowadays almost unknown. *Per contra*, the depressed may

have particularly to be studied on this account. They suffer extremes of heat and cold badly.

Those recovering from *pulmonary diseases* or subject to *bronchitis* must certainly choose a humid atmosphere. Suitable places, according to individual tastes and opportunities, are Hastings, Bournemouth, Ventnor, Falmouth, Penzance, Algeria, Madeira, the Canaries. In respect to *tuberculosis* so much depends upon the stage of the lesion, on complicating factors and on the influence of modern therapeutic measures, that no generalization is possible beyond emphasizing selection of a climate that allows the greatest amount of time to be spent in the open air. This implies a mild or warm district in the winter and one cool and more bracing in summer.

Those with *cardiac lesions* should be recommended places of moderate elevation with level walks. This applies particularly to degenerative conditions of the cardiovascular system: less solicitude is necessary in the case of well-compensated valvular disease. But the rheumatic element should be remembered. Hindhead, Crowborough, Malvern are to be recommended. A special claim is sometimes advanced for Llangammarch Wells in virtue of the barium content in its waters.

For *rheumatic subjects* dryness of the soil is desirable. Inland climates are suitable as are the southern slopes of mountains and fairly warm sea shores. Desert air is perhaps best of all.

For *kidney disease* warmth and dryness are essential. Bournemouth and Penzance are examples of suitable resorts.

Sufferers from *gastro-intestinal diseases* and disturbances are often adversely affected by sea air and they are peculiarly susceptible to chills.

*Organic nervous diseases* hardly call for any special climatic consideration except in respect to the avoidance of complications. As regards functional disorders, the social circumstances are more important than climate and a decision has to be made whether complete rest or the provision of diversions should be ensured.

The possibilities of *suitable exercise* demand careful consideration. One man's pleasure is another man's madness. To one, climbing makes a unique appeal; another prefers long but easy walks. A third will not move a leg except to follow a little white ball over variable country. To a fourth, lawn tennis is essential and to a fifth sea-bathing and swimming, and upon such provision success in convalescence may substantially depend. Intellectual recreation may have to be provided. For example, Rome might well be chosen for the combination of climate and sight-seeing. The careful physician will take heed of the possibility of fatigue which would aggravate neuralgia or hysterical and melancholic tendencies, and the danger, except to the robust, of abrupt changes from hot sun to cold galleries and churches. The advantages of a sea voyage have already been mentioned and there is much to be said for it as a long-term policy in convalescence for the neurasthenic, provided that his physical constitution and his temperament are such that the special circumstances are congenial to him.

such winds as may be encountered will be best tolerated from the west and south. The most popular sedative resorts are:—

In the Spring: the Cornish Riviera.

In the Summer: the New Forest.

In the Autumn: the Severn Valley, Bettws-y-Coed.

In the Winter: Falmouth and Cornwall generally.

For those in a position to travel and to reside at a distance, Madeira and the Canary Isles have maximum advantages, particularly in the winter or in fact throughout the entire year. The Azores are almost as good. Egypt has the advantage of dry warm sunny days with cool nights. There is low relative humidity. The atmosphere is pure, the air is rendered aseptic by breezes blowing over hundreds of miles of desert, but on occasion there is the drawback of much dust. In the desert itself the attractions are obvious: pure air, an infrequent rainfall, but provision must be made for the absence of shelter.

#### SPA THERAPY

More than once it has been represented how choice of a resort for a convalescent should be influenced by other circumstances than climate. A few words are appropriate in regard to Spas.

In assessing the value of spa-treatment, it is always difficult to separate the effects due to change of air, of diet, mode of life and mental occupation from those with which the mineral waters are credited. And even when the failure of imported or artificial waters to produce results commensurate with those obtained at the spas themselves is advanced in depreciation of any value in the waters, it is protested that somewhat subtle intrinsic properties are obtainable only at their natural source and are eliminated during transport. Be that as it may, there is often considerable value in the occupation of mind and body ensured in the discipline and organization of a "cure" to enhance the beneficial effects that reside in the climate and waters of the spa. Hygienic precautions and restrictions are tolerated, especially if advanced with an impressiveness and an atmosphere of individualization. Balneotherapy, mechano-therapeutics and physiotherapy in general all play a part whether the psychical or the physical application looms the larger, according to the bias of the physician.

#### AILMENTS AND THEIR INDICATIONS

Attention may now be directed to special climatic requirements of individual ailments.

In the first place, although a moderate degree of *coldness* is beneficial to almost everybody, it must be remembered that some people, on account of an idiosyncrasy of their peripheral circulation, are wretched in cold atmospheres, which are to them, if not injurious, distinctly disagreeable and to some extent offset the other favourable circumstances. Older subjects

have particularly to be studied on this account. They suffer extremes of heat and cold badly.

Those recovering from *pulmonary diseases* or subject to *bronchitis* must certainly choose a humid atmosphere. Suitable places, according to individual tastes and opportunities, are Hastings, Bournemouth, Ventnor, Falmouth, Penzance, Algeria, Madeira, the Canaries. In respect to *tuberculosis* so much depends upon the stage of the lesion, on complicating factors and on the influence of modern therapeutic measures, that no generalization is possible beyond emphasizing selection of a climate that allows the greatest amount of time to be spent in the open air. This implies a mild or warm district in the winter and one cool and more bracing in summer.

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# CONVALESCENT HOMES

By MISS C. MORRIS

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THE position of convalescent homes in England with their wide divergence of type, with their differences of standard, with their variety of ownership and organization, can only be fully understood by reference to the past. The history of their development is a fascinating one in that it is typical of much of what is best in English life, for it is a history not of planned enterprise but of sporadic and individual growth with all the advantages and disadvantages of such growth. It is only now, with the passing of the National Health Act, that people in authority are beginning to think in realistic terms of a nation-wide system of convalescence and to see that system as an essential part of the health service of the future rather than, as is now the case, as a collection of separate homes of varying usefulness, all working on their own lines with little, if any, connexion with each other.

## HISTORY OF DEVELOPMENT

The idea of the provision of seaside and country accommodation for people who had been ill and who were not able themselves to afford a change of air, seems to have sprung naturally out of the humanitarian movement of the late eighteenth century and to have been one of the many manifestations of the awakening of a social conscience which for long had been asleep. The fact that, broadly speaking, the movement was philanthropic and religious rather than medical has left its mark on the homes and has profoundly influenced the way in which they have developed. With the exception of a few homes, such as the Royal Sea Bathing Hospital at Margate which was founded expressly "for people from the London Hospitals needing post-hospital care", most of the homes were started and endowed by kindly persons working without any connexion with the hospitals who saw convalescence as a change of air in good surroundings and as nothing else. One consequence of this, and one which has had its effect to the present day, is that patients were apt to be regarded as recipients of charity and as such were expected to be quite uncritical of the benefits they received. This lack of expressed criticism from those particularly well placed to give it has led to a certain amount of complacency on the part of Boards of Management and has tended to slow down any change or modernization.

Throughout the nineteenth century the main impetus for the founding of homes continued to come from the growth of organized philanthropy. In addition, towards the end of the century, employers and working people

themselves started homes for members of their own trades, a movement which, with the growth of Hospital Contributory Funds, has developed in the last fifty years, during which many more such homes have been established. Some of these homes are equipped on a very lavish scale, but for the most part provide only the holiday type of care and refuse to take any person who still requires nursing, special diet or any unusual amount of rest.

Florence Nightingale, most enlightened and modern of reformers, was strong in advocating the increased use of convalescent homes as opposed to long periods in hospital, and laid down in "Hospital Notes", published in 1863, "that every hospital should have its convalescent branch and every county its convalescent home". Her shrewd and wise comments on the organization of convalescent homes and of their place in the community are still in many respects in advance of the general practice of to-day. Unfortunately her proposals for the establishment of homes fell, for the most part, on deaf ears, and expansion continued spasmodically and on quite uncoordinated lines.

The passing of the National Health Insurance Act of 1911 affected the matter of convalescence in indirect rather than in direct ways, as the provision of sick benefit in some cases made it economically possible for patients to take a longer period of recuperation than they could otherwise have done. Neither in this nor in subsequent Acts was the importance of convalescence really stressed, as freedom was left to the individual Approved Societies operating under the Act to decide whether the cost of convalescence for their members should or should not be met as one of their additional benefits, and this payment has remained until the present day "a matter of grace and not of right". The result of this is that many working class people have not been able to afford the period of convalescence of which they were really in need unless they have happened to come under the care of a hospital almoner or of some society or individual able to make the necessary arrangements and raise the required money.

The opening of convalescent homes by local authorities began shortly before the first world war and by 1939 a number had been established both for adults and children. This was not, however, a consistent policy throughout the country, and many local authorities have continued up to the present day to make financial grants, in return for the use of beds, to already existing homes run by voluntary bodies. This system has had the advantage of providing some of the homes with a settled income, apart from charitable funds, which has allowed them to develop and improve. It has also helped to prevent any artificial division arising between the different homes, such as has arisen in the past between voluntary and municipal hospitals. On the other hand, it has meant that new and increased accommodation has not been provided even though it was urgently needed. None the less, during the years between the wars many new homes were opened to meet the requirements of different classes of people, although with a few exceptions the emphasis has continued to be laid on the therapeutic value of change of

air rather than on any treatment, and there was little sign of the problems of convalescence being tackled from any fresh angle.

Yet despite all shortcomings and imperfections the English system had much to commend it and could claim by 1939 to be probably the most complete in the world. If certain homes were unprogressive and poor, others were excellently managed and their very diversity was a source of strength, as it was possible to choose for the individual patient a home likely to be congenial and therefore conducive to recovery. It is difficult on looking back not to lament that something was not done to weld the homes together, and to improve standards at a time when so much could have been done with such a comparatively small expenditure of money.

As to numbers, a survey by Political and Economic Planning in 1937 speaks of there being at that time some 500 Homes in Great Britain. It was no easier then than now to arrive at accurate figures, owing to the fact that convalescent homes have never been registered and even now do not come under any supervision. All that can be said with certainty is that, during those years, homes of one sort and another, large or small, were extremely numerous in the South of England, although the North was less well supplied.

#### THE WAR YEARS

At the outbreak of war in 1939, the position changed dramatically for the worse. Many of the homes, and especially those on the South and East coasts, were at once closed and were either left empty or were requisitioned for other purposes, and for the time being the position of the civilian sick requiring convalescence was indeed poor. As the war went on matters improved, however: a few new homes were opened for civilians, many others by the British Red Cross for Service cases, and rehabilitation homes were started for certain classes of injury. A new type of home known as "The Rest Break" came into existence and, working closely with industry, proved itself extremely useful in helping to save overtired workers from a complete breakdown.

The immediate effect of the end of hostilities was to throw the whole question of convalescence once more into a state of confusion. For one reason or another the special war-time homes closed down with alarming speed, whilst the homes which functioned before the war were slow to reopen. Some had been bombed, others had handed over their buildings to hospitals, teachers' training colleges or day nurseries and were unable to claim them back, and others are taking a long time to gather together the necessary staff and equipment. Even now after two years have elapsed there are less than 300 homes functioning, some of them quite small, in place of the 500 before the war, and this at a time when the demand for convalescence is more urgent than ever before.

#### THE PRESENT POSITION

Shortage of hospital beds with the consequent early discharge of patients,

the lack of help for the sick in their own homes, the difficulties of housing and food, as well as the ever pressing need for restoring workers to health and to work as quickly as possible, all serve to emphasize the present deficiencies and the need to utilize the accommodation now available in convalescent homes to the best advantage.

To no other profession is this matter of such grave concern as it is to almoners, for to them belongs as a rule the task of finding convalescent accommodation both for hospital out-patients and for patients being discharged from the wards. A recent survey undertaken by the King Edward's Hospital Fund in cooperation with the Institute of Almoners of those homes which take patients from the London Hospitals (and a further survey by the Institute of the homes for patients from the rest of Great Britain) has laid bare the present nakedness of the land and the strange variety in homes which are functioning at the moment.

The present position is indeed full of anomalies. On the one side are certain homes, alive, up to date and doing really constructive work, sometimes in the face of great odds in the way of out-of-date buildings and equipment, and on the other are homes still run on institutional lines with formidable lists of rules and regulations which appear to have been drawn up for the convenience of the home and not for the welfare and happiness of the individual patient. In such homes there is generally little privacy, little provision for rest, no amusement except what can be enjoyed outside the home, and often poor and monotonous food. Moreover, good and bad, there is a general and serious shortage of vacancies, so that through the summer months a patient in urgent need of convalescence has often to wait for weeks and even months for admission, which nullifies one of the main objects of convalescence, which is to hasten the patient's return to ordinary life. In the summer of 1946 the position was so acute that certain homes refused to accept new applications, and the Invalid Children's Aid Association, too, was forced to the serious step of closing their waiting list for a time.

It is now more than ever difficult to find any home which will take a patient needing part time in bed or a special diet or any active treatment such as physiotherapy. Moreover, the provision for certain types of patients, for the old, for mothers and babies, for the adolescent boy, and for patients suffering from certain types of disease, heart disease, various chest complaints, and the like, are practically non-existent.

If this were the whole of the picture it would indeed be a gloomy one, but fortunately it is not, for everywhere there are signs of hope for the future even if they are only straws in the wind. Probably at this moment more people, and certainly more medical men than ever before, are taking an interest in the question of convalescence and, more than that, are considering the general principles which underlie the question. There are signs that boards of management are considering the running of their homes in a new spirit and are willing, and in some cases even eager, to accept suggestions

and criticisms from almoners and other people in a position to hear the patient's point of view. It is surely an excellent sign that a number of homes have lately applied to King Edward VII Hospital Fund for advice on such subjects as staffing and food and have welcomed the visit, and subsequent highly skilled advice, of the King's Fund consultant dietitians. Then, too, at a recent conference arranged between matrons of homes and almoners it was cheering to find the question being discussed as to whether rules could be cast aside altogether or whether at any rate they could be reduced to a minimum and could be drawn up with courtesy and on the assumption that the patient had the intention of behaving well. Again, there is a definite move for the appointment of younger staff in homes, and by this is meant people young in mind who are willing to think out afresh the way to meet the problems involved in convalescence.

#### THE IDEAL CONVALESCENT HOME

Now it may well be asked what is the ideal convalescent home? Obviously no one pattern meets every demand, for to some people quiet, a certain amount of solitude and the beauties of nature are conducive to the regaining of health, whereas others are helped by the bustle and gaiety of a large home and by the proximity of a brass band and pierrots; and it cannot be said too often that the matter of surroundings pleasing to the individual patient is an all-important one. There is, however, in all homes, a certain common denominator of what is required. In all, whether large or small, the personality and attitude of the staff, and above all of the matron, towards the patients is of fundamental importance. It is upon her that the home depends for its atmosphere, which should be one of courage and happiness and real kindness. Rules should be as few as possible and should be framed quite clearly to help the patient who, it need hardly be said, is the most important person in the home and for whom the home exists. Once this fundamental truth is grasped by everyone concerned with the home, everything else that is needed follows quite naturally. If, in Miss Nightingale's words, the patient is "an honoured guest", then it is obvious that nothing but the best is good enough; that the reception of the patient will be friendly and kind; that food and rest will be supplied as needed; that the day will be adapted to meet his needs. It is hard to believe that in any home where this holds good the patient could be roused at crack of dawn to rise up for an early breakfast, made to go to bed while the sun is still high in the heavens, and not allowed to rest comfortably on his bed during the day, which is what is true at the moment in so many homes. The actual details of whether breakfast in bed is a matter of course for all hospital patients for most of their stay or only for the first few days will depend upon staff, on the layout of the home and on the illness from which the patient has been suffering, but the all-important point is that it should be regarded as an ordinary and desirable procedure and that even a day in bed should not be unheard of.

*The general layout.*—Compared with the personnel the question of

buildings, although of course important, takes second place. At present the merits of the homes adapted for the purpose sometimes outweigh in charm, individuality, and even in convenience, the merits of the homes built as such, but this is because many existing homes were built with the wrong ideas and at a bad period of architecture. The ideal for the future is surely that any new homes, whether large or small, should be built by architects who are interested in the question of convalescence as such, and who delight in colour and good proportions: who see beauty not as a luxury but as something as necessary to well-being as drains, a damp course, or the proper choice of a site. Buildings planned on labour-saving lines with pleasant kitchens, with adequate cooking and storing facilities, with passenger and service lifts, with bathrooms and plentiful hot water, with separate bedrooms or, if shared, divided in such a way as to give privacy, with comfortable sitting rooms, are all necessary for the future and obviously add to the ease of running a home and to its efficiency. Excellent though such things may be, however, they will always remain secondary in importance to the spirit in which the home is run, for to the end of the chapter "the dinner of herbs where love is" will give more nourishment to the human soul than the banquet where love is absent.

More attention will obviously have to be paid to the all-important question of food, its choice, its cooking, its nutritive value, its serving and the hours at which it is eaten. Equally, the question of *employment during convalescence* demands considerable thought. Probably a small number of domestic duties to help the home is quite permissible but patients should have opportunities for occupations which absorb their thoughts, give them new skills and new interests and generally enlarge their horizon. This is especially important when patients are taken at an early stage of convalescence when perforce they have long hours of inactivity. The possibility of informal talks in the home on pictures, music, natural history, has hardly begun to be explored, yet experiments in Army education have proved how valuable these can be, provided they are undertaken by people able to infect others with their enthusiasm. Then, too, there is the value of a good library.

Certainly there ought to be far greater coordination between homes; more opportunity for the interchange of ideas and information; no stagnation or complacency, but a feeling of growth and of eager and friendly emulation. Obviously this is a vital moment in the history of convalescent homes. It is expected that after July 1948 most of these homes will come under the direction of the Regional Boards, although it is hoped that in order to preserve tradition and continuity they will be run by Committees made up in part from the former boards of management. What is their future to be? Is it too optimistic to hope that the good of both worlds may be enjoyed and that together with comprehensive planning there will continue to be flexibility, variety and individuality? Provided this spirit of freedom can be linked with increased efficiency then Britain will indeed have a service which may be an example to the world.

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Epidemics of varicella have been observed in which the infection seemed to be derived from a case of zoster but the incidence of the disease in the exposed population was much lower than in epidemics of varicella in which the starting point was a case of varicella.

Both zoster and varicella confer immunity, but cross-immunity appears to be incomplete or absent since those who have suffered from varicella may subsequently contract zoster. The occurrence of varicella after zoster is infrequent but this may be on account of the higher incidence of zoster in adults in whom immunity against varicella is usually already established. It is therefore held by many authorities that the viruses are not identical, although their close association and similarity is admitted. On the other hand, some of those who maintain the identity of the viruses consider that in the case of varicella the virus has dermatotropic qualities or is a dermatotropic strain, whilst in zoster it is neurotropic. Others again have suggested that the general eruption of varicella occurs when a non-immune subject is infected, whereas the localized affection of zoster is the result of infection of a partially immune subject.

#### PATHOLOGY

The vesicle of zoster may be uni- or multi-loculated and beneath it the papillary vessels are engorged and surrounded by inflammatory cells, whilst the nerve filaments show fragmentation of the myelin and degeneration of the fibrils. The lymph glands associated with the area of skin affected are enlarged during the acute phase. The pathological changes of chief interest, however, are those in the posterior root ganglia (or the cranial nerve ganglia), the posterior roots, and the spinal cord. In the case of the first, one or more adjacent ganglia on one side of the body show intense vascular congestion, often with hæmorrhagic necrosis, mononuclear infiltration and degeneration of ganglion cells. The process is patchy even within the confines of one ganglion and many cells may escape without any apparent damage. The similarity to the patchy and irregular effects of the virus of anterior poliomyelitis is striking. Neuroglial proliferation follows and in the healed case the affected ganglion is the seat of sclerosis. Similar acute changes are found in the posterior nerve root and, though usually with less intensity, in the posterior horn of the cord in the segment or segments of the root ganglia which are involved. As a consequence of the destruction of nerve cells in the ganglion and the cord, degeneration proceeds in the associated nerve fibres of the posterior sensory nerves and the posterior sensory columns of the cord.

That infection by the virus of zoster may be more than a localized process involving the root ganglia and posterior horns of one or two segments, is shown by the occasional "spill-over" of the pathological changes into the anterior horn with consequent degeneration in motor nerve fibres and muscles, and by congestion in the spinal meninges with pleocytosis in the cerebrospinal fluid. Encephalitis has also been described and, in a few cases, well authenticated by pathological studies. This has usually occurred



# HERPES ZOSTER

By J. G. M. HAMILTON, M.B., F.R.C.P.ED.

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HERPES ZOSTER, although known since antiquity (medieval St. Anthony's fire) does not seem to have been linked in any way with the nervous system until, during the 19th century, Bright recognized its association with sensory nerves and Romberg its association with neuralgia. It is an acute infective disease of the central nervous system due to a filterable virus which possesses a special affinity for the posterior root ganglia and the posterior horns of the spinal cord. The name acute posterior poliomyelitis is sometimes used for this reason. Only one spinal segment is, as a rule, involved, but if two are affected they are contiguous. The disease may attack the ganglia of sensory cranial nerves. In conjunction with the lesion in the ganglion there is a vesicular eruption on the skin served by the associated sensory nerve, having, if on the trunk, the pattern of a half-girdle. It is this eruption with the accompanying pain which constitutes the clinical condition of "shingles".

## ETIOLOGY

The sexes are more or less equally affected and the disease is generally considered to have its main incidence in middle age and later, although in Head's classical series children and adolescents provided the majority of the cases. Zoster usually occurs as a separate and specific disease with no apparent precipitating cause, but its occurrence in patients with neurosyphilis, spinal cord tumours, syringomyelia and other neurological disorders, and in patients undergoing treatment with arsenic, other metals, or vaccines, prompted its division into "primary" and "symptomatic" groups. There is little evidence to support such a separation, for in all instances the clinical and, so far as is known, the pathological pictures are the same in the two groups. It may be better to regard all cases as zoster and preserve an open mind as to whether or not the associated conditions have any etiological or localizing significance. The virus has been recovered from the vesicles and the cerebrospinal fluid of human cases and transmitted to animals by intracerebral injection, monkeys dying from meningo-encephalitis after such inoculation. Dermal injection of the vesicular fluid of zoster into susceptible human beings may produce a cluster of vesicles around the site of the injection although a segmental "girdle" rash is not obtained; or there may be a generalized vesicular eruption simulating varicella.

A close association exists between the causative agents of zoster and varicella although it is not certain that the two are identical. The occurrence of a case of zoster is not infrequently followed by the development of varicella in a contact after an interval of about two weeks. On the other hand, varicella is only rarely followed by zoster in contacts. Zoster is itself contagious but its infectivity is much lower than that of varicella. It may be followed by the same disease in one contact and by varicella in another.

cases to *motor paresis* in the distribution of the affected nerve. Such motor involvement is more frequently seen in the shoulder and arm than in the lower limb. The patient may notice the weakness of movement, e.g., of the biceps and deltoid in the presence of a rash on the outer aspect of the shoulder and upper arm. As a rule the weakness is slight and not noted until the pain has lessened. Wasting of the affected muscles follows as in anterior poliomyelitis.

#### INCIDENCE AND SITES OF AFFECTION

The classical account of the incidence in different spinal segments is that of Head (1910).<sup>\*</sup> Of 394 cases affecting the spinal cord, thoracic segments were involved in 284, lumbar in 57, cervical in 47, and sacral in 6; of the lumbar cases 49 involved the first or second segments; 36 cervical zosteræ involved the 3rd or 4th segments. There seems to be no satisfactory explanation for this striking preference for the thoracic roots, which is in contrast to the affinity which the virus of anterior poliomyelitis displays for the cervical and lumbar parts of the cord.

The incidence of zoster is not, however, confined to the spinal cord, for the virus is liable to involve the ganglia of the sensory cranial nerves, notably the Gasserian ganglion of the trigeminal nerve (22 of 416 cases in Head's series). In this event the eruption appears in the skin area of one of the divisions of the nerve, and of these the ophthalmic division is much more frequently involved than either the mandibular or the maxillary division. Hence *Gasserian zoster* is almost synonymous with *ophthalmic zoster*. The rash may extend widely from the root of the nose and the eye to the vertex, but it is most often seen on the forehead and on the anterior and lateral parts of the hairy scalp. When vesicles appear on the eyelid and near the inner canthus, local œdema may close the eye. Ulceration follows involvement of the cornea itself and secondary infection may then give rise to extensive and serious inflammation of the globe. Neuralgic pain in the eye and scalp in ophthalmic zoster is often of great severity and may occasion the utmost distress; the risk of ocular damage may be accompanied by ipsilateral ptosis and ophthalmoplegia of greater or less severity. It is probably not necessary to postulate a coincident encephalitis; extension of the virus from the 5th nerve to the 3rd (usually), 4th or 6th nerve is the likely mechanism. *Geniculate zoster* is much less frequent than Gasserian and its main interest lies in the fact that it may cause a lower neurone facial paralysis: usually there is an herpetic eruption involving the tympanic membrane, meatus and external ear but occasionally no rash is apparent.

As has been noted already, the virus of zoster may attack *the brain*. Frank encephalitis is fortunately a rare complication, although it can be fatal. Most of the cases have been examples of Gasserian or cervical zoster. Oculomotor palsies, nuclear facial paralysis or other results of affection of the mid- and hind-brain may occur, but there may also be confusion,

<sup>\*</sup>Head, H. (1910): Allbutt and Rolleston's "System of Medicine," vol. 7, p. 470.

in association with Gasserian zoster affecting the ophthalmic division of the trigeminal nerve, or with cervical zoster. In such encephalitis there may be extensive meningeal injection and perivascular infiltration in the pons and medulla, the cerebellum, the thalamus and the hypothalamic area, and even the cortex. It would seem from such pathological studies that although in most cases the results of the infection are largely confined to one or two segments, the virus may affect the central nervous system in an extensive and even fatal way.

#### CLINICAL FEATURES

The onset of the disease is in the manner of a generalized infective process with mild fever and general malaise, and there may also be headache and signs of meningeal irritation. Local symptoms may appear coincidentally, or may be delayed for a day or two. These take the form of burning or tingling in the skin distribution of one or two nerve roots. Often there is frank *pain* in this area, and the pain may be deep and boring or sharp and lancinating (pre-herpetic neuralgia). There is erythema and tenderness of the skin in the same area. About the third or fourth day vesicles appear. Although the erythema may be seen over most of the skin in the affected dermatome, the vesicles commonly appear only in localized clusters at the points of emergence of the posterior division, and the lateral and anterior branches of the anterior division in the case of an eruption on the trunk. There is often some diminution in the intensity of the pain and the paræsthesia as the eruption develops. The eruption may extend during the next few days until a half-girdle is formed, but as a rule it remains incomplete.

*The vesicles* contain clear fluid. Some remain discrete, others coalesce. If left undamaged they usually subside of their own accord and form a dry crust which separates a week or ten days after the onset, leaving a shallow pitted scar. Secondary infection of the vesicles is frequent, however, since they are often broken by rubbing upon clothes or by scratching. The fluid then is purulent or blood-stained. Severe and painful cellulitis may follow and the eventual scars are obvious and disfiguring. Even in the absence of secondary infection the regional lymphatic glands are enlarged and may be tender during the life of the eruption, but they subside several days before the crusts separate.

*Site of distribution.*—The eruption is usually restricted to the skin distribution of only one posterior nerve root. Sometimes a few vesicles appear also in the area supplied by the root above or below. It is rare for the rash to appear on both sides of the body, but the erythema and a few vesicles may cross the midline for one or two centimetres. Since the eruption is accurately followed the eruption occupies a horizontal band when the trunk is affected and a more or less vertical band when the face or limbs are affected.

There is *sensory impairment* in the affected dermatome, which is incomplete and patchy and may be confined to the trunk. The anæsthesia of badly scarred areas is permanent. The anæsthesia of badly scarred areas is permanent. The anæsthesia of badly scarred areas is permanent.

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drowsiness, hemiplegia cerebellar disturbance, and an Argyll-Robertson pupil. Finally, spinal zoster may be complicated by incomplete *transverse myelitis* giving a Brown-Séquard syndrome of motor weakness with an extensor plantar reflex in one leg, and sensory loss over the other leg. There may be impairment of sphincteric control of the bladder.

Examination of the *cerebrospinal fluid* during the active stage of zoster commonly reveals a lymphocytic pleocytosis averaging about 25 cells per c.mm. This increase in the cell count may be found before the rash appears and the count may not return to normal for some days or weeks after the crusts have separated. The total protein may be increased but the change is a slight one: sugar and chloride contents and fluid pressure are normal.

#### POST-HERPETIC NEURALGIA

It has been stated already that the neuralgic pain or paræsthesia which precedes the appearance of the vesicles may diminish or disappear as the eruption develops, leaving only the discomfort of the rash. These sensory symptoms may persist, however, in gradually diminishing intensity for some days after the subsidence of the rash. In what is fortunately a small minority of cases post-herpetic neuralgia develops. The pain or the sensation of tingling or burning of the acute stage does not entirely abate and some days or even weeks after the acute stage is over the patient complains of aching pain or a stinging or burning sensation in the area originally affected. This is liable to paroxysmal exacerbations which may be of great intensity. Post-herpetic neuralgia, which may persist for weeks, months or even years, can thus be a cause of almost intolerable distress. It is found much more frequently in the elderly than in the young, and after thoracic or ophthalmic zoster rather than those affecting other segments. Occurring after ophthalmic zoster such neuralgia is a cause of persistent and disabling headache.

The mechanism of the production of post-herpetic neuralgia is imperfectly understood. It has been suggested that it is the result of the formation of scar tissue in the affected ganglion, but there is little evidence that such scarring is of greater intensity in the elderly or that the occurrence of neuralgia is entirely dependent upon the severity of the original illness, at least so far as the extent of the eruption is concerned. Many patients show signs of psychoncrosis, often an important predisposing factor.

#### TREATMENT

Most virus diseases remain in the unsatisfactory position of having no specific form of treatment, and zoster is no exception. There is experimental evidence that the administration of serum from convalescent human cases confers some degree of passive immunity on contacts, but the method is largely unproved and not practically available. The incidence of the disease in contacts is probably not sufficiently high to warrant any prophylactic measures other than reasonable hygienic precautions.

*The skin.*—The treatment of the disease resolves itself into the care of the affected area of skin, and the control of pain. The patient, especially the

elderly patient, should be confined to bed for a period of about a week, or for longer if there is much pain or if the vesicles become badly infected. The skin should be dusted daily with fine talc powder and covered by a thick layer of cotton-wool to protect the vesicles from injury by friction. The vesicles should be allowed to dry and crust of their own accord. The dusting and protection may be continued until the crusts have separated, or a 1 per cent. ammoniated mercury paste may be applied instead of the powder when the stage of crusting has been reached. Some people prefer to use collodion or Unna's zinc gelatin paste as a protective coating. If the vesicles have been injured and secondary infection has occurred the whole area may be painted daily with a 1 per cent. aqueous solution of gentian violet; or penicillin cream may be applied, whilst the development of frank cellulitis calls for the use of parenteral penicillin with or without the oral administration of sulphonamide.

*The eyes.*—When the rash involves the ophthalmic division of the trigeminal nerve the cornea should be inspected at frequent intervals, since ulcers may not appear for several days after the eruption is apparent on the neighbouring skin. Cold compresses are useful for the œdema of the eyelid and if the cornea is involved atropine should be instilled into the conjunctival sac. As a prophylactic against secondary infection a 2½ per cent. albucid solution may be instilled twice daily or a solution of penicillin (1,000 to 2,500 units per c.cm.) every three hours. Lamellæ containing 100 to 200 units of penicillin, inserted four-hourly, are also useful.

For the control of pain the injection of 0.5 to 1 c.cm. of pituitrin, once or twice daily, during the first few days of the disease is sometimes most effective, although the mode of action is doubtful and there is no certainty of results. Analgesics, such as aspirin, or aspirin, phenacetin and codein, may be required in the pre-eruptive and eruptive stages.

*Post-herpetic neuralgia* can be most intractable. The same types of analgesic should first be employed in full doses, for in many cases there is progressive improvement over a number of weeks and the patient may be encouraged to expect the eventual disappearance of his discomfort. In the elderly it is often justifiable to give opiates, and heroin,  $\frac{1}{5}$  to  $\frac{1}{8}$  of a grain (5.4 to 8 mgm.) by mouth, may be used, but this should be avoided in the younger patient, for the risks of addiction are great. The same caution is strongly advised regarding the use of pethidine. The continued use of bromides should also be avoided for it may produce confusional psychosis without assisting greatly in the reduction of pain. The application of ultra-violet light, radiant heat, infra-red radiation and X-radiation gives disappointing results. In persistent and severe cases section of the posterior nerve roots, cordotomy, alcohol injection of the Gasserian ganglion or section of the sensory root of the trigeminal nerve may be required to give relief, and the result is sometimes immediately and gratifyingly successful. However, pain may recur even after such drastic measures. Associated motor paresis, cranial or spinal, should be treated by massage and other physiotherapeutic measures, and by splinting when necessary.

# THE RECOGNITION OF NEUROTIC ILLNESS

By H. G. MILLER, M.D., M.R.C.P., D.P.M.

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DESPITE the increasing recognition accorded to emotional factors as a cause of obscure physical symptoms, many cases of neurotic illness still go begging for a diagnosis, and are subjected to repeated hospitalization, ancillary investigations, and even operative measures, before the true nature of the condition is appreciated. There is a tendency, the product of increasing departmentalization in medicine, for successive specialists to be called in, for them to pay attention only to that part of the history which refers to the particular system in which they specialize, and for them to find, in a considerable number of cases, one or other of those minor abnormalities of which few people are entirely free. Their searches may reveal a minor refractive error, a slightly deflected nasal septum or a sinus opacity, a labile systolic blood pressure, a badly filling appendix or a gastroscopic mucosal blush; or some other minor local condition, the irrelevance of which, in relation to the patient's general condition and often widespread symptoms, is too frequently recognized only after the failure of radical local treatment.

The physicians of an earlier age, accustomed to base their diagnoses on a careful history and clinical examination, were perhaps less often thus at fault, and the writings of Allbutt and Osler show a clearer appreciation of emotional factors in diagnosis and treatment than is evident in the works of their more laboratory-minded successors.

Equally striking is the fact that the worst mistakes in this connexion, and the worse excesses of polyphysical therapy, must be laid at the door of the specialist rather than the general practitioner, who, from his intimate contact with sick people in their natural surroundings, often has a lively understanding of the nervous patient, and is able to see him and his problems as a whole.

The advances made in the understanding of the human mind and its motives during fifty years of depth-psychology have been largely devoted to laying a theoretical basis, and are directly applicable from a therapeutic point of view to only a small minority of patients. They have done little to facilitate diagnosis, and nothing to relieve the practitioner of responsibility for the initial recognition of neurosis, or for the management of that large majority of such patients for whom a formal psychiatric approach is both unnecessary and economically impracticable.

What then are the clinical pointers to the early recognition of neurosis by the general physician, who is the first to see most of these patients?

The first rule is that the diagnosis must not be made by exclusion.

Apart from its expense, inconvenience, delay and psychological ill-effects, such a method has two definite dangers. First, a ruthless and systematic effort to exclude all organic diseases which could possibly be related to parts of the patient's symptom complex will often reveal a minor organic finding which may put the investigator off the track of the emotional causes primarily responsible for the disturbances of function which constitute the patient's symptoms. Secondly, an erroneous diagnosis of neurosis, based, not on any positive findings but on the confidence engendered by a sheaf of negative laboratory and X-ray reports, may be made in a case of early organic disease, with disastrous results.

Fortunately there are characteristic features in most neurotic illnesses which will usually permit a correct positive diagnosis at an early stage. Most of these become evident on taking a careful medical history.

#### THE COMPLAINT

There are several important reasons for recording the complaint in the patient's own words. Many psychogenic symptoms are physically mediated through the autonomic nervous system, and are qualitatively similar to those encountered in organic disease. It is in the manner in which the whole story is told, and the setting in which the symptoms appear, rather than in the nature of individual symptoms, that the neurotic history is characteristic.

*The chronic anxiety state* is the neurosis most commonly seen by the general physician. Here the complaints, which represent the physiological concomitants of anxiety, are almost invariably multiple, and the history is usually vague and discursive, without a clear beginning or chronological development. Such patients can rarely give a definite answer to the question "When were you last really well?", and indeed the account of the present complaint, traced back, often merges imperceptibly into a lifelong past history of similar episodes at times of stress. The complaint that it is difficult to obtain a clear history from the neurotic subject, however, is in part due to the fruitlessness of the practitioner's attempts to make the story fit an organic pattern. Often, feeling that his duty is the exclusion of a physical disease entity rather than the treatment of the patient's complaints, he is prone to seize on the first physical symptom the patient mentions, and to analyse it in detail, brushing aside the patient's discursions into his other symptoms, attention to which would soon convince him that he is dealing with a personality dysfunction and not with a diseased organ. This multiplicity of complaints is a striking and important feature of the anxiety states. The order of importance of the symptoms may vary markedly at different interviews, and the patient will often fail to mention, until specifically asked, a symptom recorded a few days earlier as the main complaint. The symptoms are often related with a wealth of descriptive analogy which indicates considerable introspection, and amongst the complaints may be recognized normal physiological phenomena, such as pins and needles in a crossed leg, spots before the eyes, or dizziness on sudden changes of



# THE RECOGNITION OF NEUROTIC ILLNESS

By H. G. MILLER, M.D., M.R.C.P., D.P.M.

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DESPITE the increasing recognition accorded to emotional factors as a cause of obscure physical symptoms, many cases of neurotic illness still go begging for a diagnosis, and are subjected to repeated hospitalization, ancillary investigations, and even operative measures, before the true nature of the condition is appreciated. There is a tendency, the product of increasing departmentalization in medicine, for successive specialists to be called in, for them to pay attention only to that part of the history which refers to the particular system in which they specialize, and for them to find, in a considerable number of cases, one or other of those minor abnormalities of which few people are entirely free. Their searches may reveal a minor refractive error, a slightly deflected nasal septum or a sinus opacity, a labile systolic blood pressure, a badly filling appendix or a gastroscopic mucosal blush; or some other minor local condition, the irrelevance of which, in relation to the patient's general condition and often widespread symptoms, is too frequently recognized only after the failure of radical local treatment.

The physicians of an earlier age, accustomed to base their diagnoses on a careful history and clinical examination, were perhaps less often thus at fault, and the writings of Allbutt and Osler show a clearer appreciation of emotional factors in diagnosis and treatment than is evident in the works of their more laboratory-minded successors.

Equally striking is the fact that the worst mistakes in this connexion, and the worse excesses of polyphysical therapy, must be laid at the door of the specialist rather than the general practitioner, who, from his intimate contact with sick people in their natural surroundings, often has a lively understanding of the nervous patient, and is able to see him and his problems as a whole.

The advances made in the understanding of the human mind and its motives during fifty years of depth-psychology have been largely devoted to laying a theoretical basis, and are directly applicable from a therapeutic point of view to only a small minority of patients. They have done little to facilitate diagnosis, and nothing to relieve the practitioner of responsibility for the initial recognition of neurosis, or for the management of that large majority of such patients for whom a formal psychiatric approach is both unnecessary and economically impracticable.

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of neurotic patients admit to a previous "nervous breakdown", and a much higher proportion to previous nervous symptoms. The patient may describe one of those bizarre illnesses of which the hysteric delights to relate "it puzzled all the doctors". Commoner still is a history of illnesses organically labelled but showing many neurotic features in retrospect. "Debility", "anæmia", and "gastritis", are frequent amongst such diagnoses.

A family history of neurosis is found in at least half these cases, and indeed its absence demands particular care in diagnosis. Doubly significant is a similar record of psychosis or suicide. Neurotic symptomatology itself runs in families, often by imitation, sometimes perhaps because of the presence of a common structural substrate. Such a family history is particularly common in headache and stomach troubles.

The personal and family history of organic disease may also be of considerable significance in determining the nature and localization of symptoms. The frequency of a family history of organic heart disease in cases with effort symptoms, of functional pulmonary symptoms in those anxious about a family history of tuberculosis, and the persistence and recurrence, at periods of emotional stress, of headaches which originally followed head injury, are examples.

The general practitioner rarely has adequate time to elicit the full social history which is so valuable in expert psychiatric assessment, but an account of the patient's work record takes only a few moments to obtain, and sheds valuable light on his intelligence and stability, and sometimes on the nature of his symptoms, which may be recognizable as an hysterical escape mechanism from an uncongenial environment.

#### PHYSICAL EXAMINATION

The neurotic patient may reveal his emotional upset on interview by breaking down into tears, by gross tremulousness usually most marked in the hands, but in severe cases sometimes evident in the head and neck; by facial tics or stammering, or by picking or biting his nails in front of the interviewer. Often, however, such gross evidences are lacking, but suspicion is aroused by a tense expression, motor restlessness, and a nervous hesitancy in coming to the point.

The first aim in the systematic physical examination of the suspected neurotic is of course the exclusion of physical disease, and this should be carried out thoroughly, no matter how typical the symptoms may appear.

In addition, however, the physical examination may yield positive information in the diagnosis of neurosis.

The patient whose multiple symptoms represent the physiological concomitants of anxiety will usually show one or more typical signs—tremor of the outstretched hands, a labile pulse rate and systolic blood pressure, heavy sweating of the palms and axillæ, and over-brisk reflexes. Often apprehen-

of remissions, and usually shows a generalized epigastric hyperæsthesia rather than the finger-point tenderness of peptic ulcer.

In women *abdominal pain* is a common symptom. Characteristically vague, shifting, hypogastric or in the right upper quadrant, unassociated with a constant local tender spot or with loss of weight, and lasting for years without the development of obstruction or jaundice, pain of this type is rarely associated with unequivocal organic findings. Despite this, it has typically resisted, unchanged in character, one or more operations. Chronic appendicitis is uncommon, adhesions rarely the cause of chronic pain, and if, after a history of some years, the cholecystogram still shows a clearly outlined gall-bladder, surgical intervention is unlikely to relieve the condition. Persistent painless vomiting or diarrhœa without weight loss is usually an hysterical symptom.

*Urinary symptoms.*—Cases of dysuria and frequency in the male, without positive findings on physical examination or in the urine, rarely show any abnormality on cystoscopy or pyelography. These symptoms, like other smooth muscle disorders, are often associated with other anxiety manifestations, and respond better to general than to local treatment.

*Cardiac symptoms.*—Nowhere has the manufacture of organic-sounding syndromes from the symptomatology of neurosis done such harm as in the "effort syndrome". The majority of patients in anxiety states are over-conscious of their circulatory responses and many of them complain of palpitation, dyspnœa, and præcordial pains. In some of these, particularly in those called upon to undertake unaccustomed physical exertion, such symptoms may come to dominate the clinical picture, but inquiry will nearly always reveal other neurotic complaints, headache, sleeplessness, dyspepsia, and general nervousness. Præcordial pain of organic origin is excessively rare before middle life, except in acute pericarditis or obvious congestive failure. In anxiety states it lacks a clear relation to exertion, is often marked at rest and associated with a capricious and disproportionate dyspnœa, whilst palpitations are a prominent feature. A labile pulse rate and systolic blood pressure, rapidly responding to rest and sedatives, heavy sweating, and præcordial hyperæsthesia, complete the picture. The objective evidence of heart disease—cardiac enlargement, basal congestion, blood spitting, œdema and murmurs of organic type—are all lacking. Only too often, however, unwise medical suggestion has linked his symptoms with the heart in the patient's mind and he clings to a suspicion of organic cardiac disease despite every subsequent effort to wean him from it. He may have seen a dozen medical men who have done their best to reassure him, but the one whose words he remembers and quotes is the one who told him that he had a weak or tired heart.

#### PAST AND FAMILY HISTORY

Few practitioners are unlucky enough to see a patient in his first neurotic episode, and the past history is usually most informative. About a quarter

of neurotic patients admit to a previous "nervous breakdown", and a much higher proportion to previous nervous symptoms. The patient may describe one of those bizarre illnesses of which the hysteric delights to relate "it puzzled all the doctors". Commoner still is a history of illnesses organically labelled but showing many neurotic features in retrospect. "Debility", "anæmia", and "gastritis", are frequent amongst such diagnoses.

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sive of examination, he may become acutely anxious and hyperpnœic on ophthalmoscopy.

Of the gross hysteric referred for psychiatric opinion, however, it has often been noted that he "does not look a neurotic type". Typically (although mixed states are not infrequent) he has no evidence of overt anxiety and is often a cheerful, strapping fellow with only one complaint, and that closely simulating organic disease but lacking all unequivocal physical signs. His happy unconcern in the face of his disability—the "*belle indifférence*" noted long ago by Charcot—is in marked contrast to the troubled faces of the patient in an anxiety state, who does not possess the knack of disposing of his emotional difficulties as symptoms. Some such cases require considerable investigation before their hysterical temperament is recognized, but in many the characteristic self-dramatization, volatility, emotional immaturity and complete lack of insight are striking. Their naïve deceptions—and it is often difficult to discover that they are essentially deceiving themselves as well as hoping to deceive the observer—are all devoted to disguising their inadequacies. Thus one timid hysterical subject, asked about diving, replied "Well, actually I went in more for life-saving", and another that he was "pretty good at motor racing, and had passed Malcolm Campbell".

Most of the physical signs by which the hysteric is recognized depend upon his suggestibility, and on the fact that the complaints represent his mental picture of a disease, with all its discrepancies from the physical actuality.

*The clinical picture of hysteria* has changed with the years. The classical "grande hystérie" with fits and dramatic contortions is rarely seen now, and even the pareses, paraplegias, and anæsthesias which were the typical escape mechanisms of the 1914-18 war, and the recognition of which may demand neurological skill of a high order, are less common to-day. As increasing medical familiarity has made such complaints less effective in obtaining the desired end, and they are less often encouraged by repeated neurological examinations, so persistent headaches, "black-outs" and multiple musculo-skeletal pains have taken their place. The gross hysteric, however, remains highly suggestible, and it is often possible, with the aid of a sharp pin, to persuade him into a classical hemianæsthesia or other sensory loss characterized by its completeness, non-anatomical distribution, and sharply defined margin.

The points of tenderness in the hysterical back can be shown to vary during a single examination by the use of the skin-pencil, and gentle pressure repeated a few times on the same spot will usually produce a positive result.

Equally characteristic is hysterical muscular weakness, best demonstrated with the patient lying flat and being asked to raise the outstretched leg "with all his strength" against the gentle pressure of the examiner's little finger on the lower tibia. The simultaneous contraction of agonists and

antagonists with the expenditure of great apparent effort and little result, constitutes a valuable positive sign of hysteria.

#### SOURCES OF ERROR

The erroneous diagnosis of organic disease as neurotic is generally regarded as being a more serious mistake than the commoner error of attaching an organic label to a neurotic patient, although in fact an erroneous diagnosis of "mild hypertension", thyrotoxicosis or other endocrinopathy, anæmia, rheumatism, myocarditis or colitis, may be equally unfortunate in its results for the neurotic patient.

The first error can usually be avoided by diagnosing neurosis, not only on careful exclusion of organic disease by physical examination and such ancillary tests as are indicated, but also, and only, on positive evidence of neurosis.

Experience of a large number of neurotic patients suggests some simple rules by which many mistakes could be avoided. The optic discs should be examined in every patient complaining of headache. Every case of dyspepsia or abdominal pain should have a careful history and clinical examination, and a series of occult blood tests. A combination of these yields at least as accurate a diagnosis as radiological examination, in which too implicit confidence is often placed, although this is not infrequently desirable as a basis for therapeutic reassurance. Clinically significant anæmia can usually be recognized by examination of the mucous membranes, but every young patient in whom lassitude is a prominent feature should have a chest X-ray and blood sedimentation rate to exclude pulmonary tuberculosis. Patients complaining of multiple musculo-skeletal pains—a not uncommon hysterical symptom, particularly in dull and backward subjects—should have an X-ray of bone at the site of severest pain, a blood sedimentation rate, and urine examination. This would go far to exclude such commonly missed sources of skeletal pains as secondary cancer and generalized bone diseases.

Every patient who is first seen with symptoms suspicious of neurosis in middle life, should have a full neurological examination, with particular reference to pupillary reactions, and a blood Wassermann, as well as blood pressure readings and fundus examination; otherwise cases of neurosyphilis and cerebral arteriosclerosis will be missed.

Finally, a number of patients will be seen in whom, although the symptoms cannot be accounted for by organic findings, there are none of the superficial positive evidences of neurosis. If a repetition of the organic investigations fails to reveal unequivocal evidence of organic disease, the temptation to diagnose neurosis *faute de mieux* must be resisted. These are the patients who should be referred for expert psychiatric assessment, which can be as useful in excluding a psychogenic origin as in finding and treating one.

# PAIN AND ITS PROBLEMS

## VIII.—PAIN IN MIDWIFERY AND GYNÆCOLOGY

By G. W. THEOBALD, M.D., M.R.C.P., F.R.C.S.Ed., F.R.C.O.G.

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PAIN is the most common symptom of which a woman complains to the gynæcologist, as it is occasioned by the birth of nearly every child. Pain encountered by the gynæcologist may arise either wholly or in part in the uterus, or it may arise either wholly or in part in the Fallopian tubes, ovaries, intestines or pelvic fascia, and all these structures are supplied by visceral afferent nerves travelling in sympathetic pathways. It may also arise in somatic structures, such as the vulva, vagina, pelvic bones, peritoneum and body wall, which are known to be supplied by somatic nerves. It would, however, be erroneous to assume that sympathetic nerves play no part in the causation of pain which arises in strictly somatic tissues.

Before considering certain clinical aspects of pain, I propose briefly to consider the following three theoretical problems which are of great importance:—

(1) Are the viscera supplied by afferent nerves which mediate the sensation of pain?

(2) Can referred pain be relieved by anæsthetizing the cutaneous areas to which it is referred?

(3) Do sensory nerves carrying the sensation of pain reach the sensory area of the cortex?

### ARE THE VISCERA SUPPLIED BY AFFERENT NERVES WHICH MEDIATE THE SENSATION OF PAIN?

The history relating to this problem, largely made by British observers, must perforce be omitted. Physiologists, notably the late Professor McSwiney in this country, have shown that the viscera are directly or indirectly supplied with visceral afferent nerves, but they are not in the position to state whether these visceral afferent nerves conduct the sensation of pain; they can only observe the reflexes caused in decerebrate or anæsthetized animals by stimulating the viscera. No viscus in the body, other than the uterus, can be directly stimulated, apart from some cutting operation, or the passage of instruments which traverse structures supplied by somatic nerves, and exert pressure, the effects of which are incalculable. It follows that the gynæcologist is in a unique position to investigate the problem of visceral pain.

The pain of *primary dysmenorrhœa* is referred to cutaneous areas supplied by the ilio-hypogastric and ilio-inguinal nerves, as in the pain of the first stage of labour. Identical pain is caused in some women by the application of a stick of silver nitrate to the cervical mucosa. A low spinal anæsthetic, limited to the saddle area, does not relieve the pain associated with dysmenorrhœa, the first stage of labour, or that occasioned by the application of the silver stick to the cervical mucosa; neither does it permit the cervical canal to be dilated without causing intolerable pain. Further, anæsthetization of the cutaneous areas supplied by the ilio-hypogastric and ilio-inguinal nerves may not only abolish pain arising in the uterus, however occasioned, but also pain arising in the Fallopian tubes, ovaries and fundus of the bladder. This evidence affords proof, and so far as I am aware the only proof, that an abdominal viscus is supplied by nerves which conduct pain impulses. It also shows that uterine pain is referred to the cutaneous areas innervated by the 1st lumbar nerve, although it must be remembered that the ilio-hypogastric and ilio-inguinal nerves receive fibres from the twelfth thoracic and second lumbar nerves.

Visceral afferent nerves also conduct the sensation of sickness and impulses which affect the vasomotor system. Menstruation may be associated with a sensation of nausea and accompanied by diarrhœa, and indeed the pain of dysmenorrhœa may be cured without affecting the incidence of the associated nausea. Deep pain is described as "sickening", and it is at least possible that the sickening quality is due to the associated stimulation of afferent fibres distinct from those mediating pain, just as touch fibres may be affected when a painful stimulus is applied to the skin.

#### CAN REFERRED PAIN BE RELIEVED BY ANÆSTHETIZING THE CUTANEOUS AREAS TO WHICH IT IS REFERRED?

Pain associated with dysmenorrhœa and the first stage of labour may be abolished by infiltrating the ilio-hypogastric and ilio-inguinal nerves as they pass in close relation to the anterior superior iliac spines. In point of fact it is notoriously difficult to anæsthetize these two nerves and it is true that the anæsthetization of some of the fibres concerned suffices to abolish the pain. On the other hand, complete anæsthetization of the cutaneous areas supplied by these two nerves, which may be accomplished by the injection of some 120 c.cm. of a 0.5 per cent. solution of procaine, does not suffice to allow the cervical canal to be dilated, or to abolish the pain which may be caused by applying the silver stick to the cervical mucosa. The pain is still referred to an area of skin which is completely anæsthetic. It may therefore be asserted that referred pain up to a certain intensity can be abolished, whereas pain exceeding that intensity may possibly be alleviated but not abolished by the anæsthetization of the cutaneous areas to which it is referred.



## DO SENSORY NERVES CARRYING THE SENSATION OF PAIN REACH THE SENSORY AREA OF THE CORTEX?

Dr. Gordon Holmes<sup>1</sup> has stated that the ventro-lateral nucleus of the thalamus "is almost certainly the main perceptive centre for the affective aspects of pain", and suggests that the accurate localization and discrimination of the stimuli that excite it must be attributed to the touch, pressure, and other sensations evoked at the same time. Professor Adrian<sup>2</sup> expressed the same view when he stated "that the cortex no doubt contributes to the perception of pain as a mental event, but the pain signals themselves play little part in the elaboration of cortical or mental patterns". This conception harmonizes with many authenticated observations, but suffers from the great disadvantage that it fails to explain other equally valid evidence. Renal colic, gall-stone colic, indeed all pain referred from the viscera is fairly accurately localized, and the character of each pain is the same wherever in the world it has been studied. Why should men and women of all nationalities when they experience renal colic, perhaps for the first time when they are over forty years of age, describe it in almost identical terms? Tactile and other sensations cannot assist in the localization of such pain, and if its perception were affected in the ventro-lateral nucleus of the thalamus it is difficult to understand how discrimination and localization could be so accurate and so consistent. I am of the opinion, for this and other reasons, that pain impulses reach the sensory area of the cortex. In any event the mental state undoubtedly modifies the intensity of pain perception.

### PRACTICAL CONSIDERATIONS

In order to relieve pain it is important to obtain an accurate history, which must include information concerning the onset of the pain, its distribution, its character, its relation to other events, its time intensity curve, and the measures which relieve it. It will be found, for instance, often only after careful questioning, that primary dysmenorrhœa is rarely associated with the first period, and only becomes established after the course of one or more years. This single fact provides strong evidence that dysmenorrhœa cannot be attributed to structural defects of the uterus, and challenges many of the textbook hypotheses concerning its causation. This view is strengthened by the fact that some women suffer intense pain during some periods and none at others. Constipation, worry, overwork, and dissipation tend to enhance the pain, whereas good health associated with happiness tends to prevent its occurrence.

Having obtained an accurate history of the pain the gynæcologist may relieve or prevent it in one of six ways:—

- (1) By attention to the general and mental health of the patient.
- (2) By psychological treatment, often of a very simple character.
- (3) By the use of hormones.

<sup>1</sup> *The Practitioner*, Feb. 1947, 158, 165;   <sup>2</sup> *Ibid*, Jan. 1947, p. 76.

- (4) By the use of local anæsthetics.
- (5) By the use of analgesic drugs.
- (6) By surgical measures.

#### LABOUR PAINS

The pain associated with *the first stage of labour* arises in the uterus and is probably caused by the dilatation of the internal os uteri. The most severe pain of child-birth is associated with the latter part of the first stage of labour. The pain associated with the second stage of labour is largely due to the stretching of the vagina and perineum, and the concomitant pressure on the deeper structures.

The relief of the pangs of child-birth should begin many months before the event. Fear, anxiety and lack of confidence not only augment the appreciation of pain, but actually prolong the duration of labour, thereby endangering both mother and child. This is not the place to discuss how or why this happens, but to stress the importance of gaining the woman's confidence, teaching her to practise active as opposed to passive relaxation, and to ensure that she partakes of an adequate diet and takes plenty of fresh air and exercise throughout the course of her pregnancy. Grantly Dick Read has done a good service in publicizing these ideas, even though he may be considered to have over-simplified the problem and to have made exaggerated claims.

With regard to the relief of the actual pain of the first stage of labour I would merely emphasize that it is of paramount importance, not only on humanitarian grounds, to afford the woman sleep and rest. Analgesic drugs do not prolong labour—they shorten labour and make it safer both for the mother and the child.

Pain associated with *the second stage of labour* is easily relieved by the use of a local anæsthetic. The anterior surfaces of the labia majora and the mons veneris are supplied by the ilio-inguinal and genito-crural nerves and sometimes by the ilio-hypogastric nerves. The perineum and anus receive their sensory innervation from the pudic nerve and the pudendal branch of the small sciatic nerve. The pudic nerve on either side may be infiltrated with a solution of local anæsthetic as it lies in the ischio-rectal fossa. The other nerves involved may be anæsthetized by infiltrating the tissues on either side of the labia majora up to the mons veneris anteriorly, and to either side of the anus posteriorly, with a suitable solution of a local anæsthetic. This procedure suffices for the application of the forceps, provided the head is at the outlet, and also for a breech delivery.

#### THE PAIN OF DYSMENORRHŒA

The pain of primary dysmenorrhœa is very similar to that associated with labour and may be relieved by anæsthetizing the cutaneous branches of the 1st lumbar nerve. It is usually relieved by presacral sympathectomy, but is liable to recur. It is possible, if not probable, that the division of this

band of neural tissue merely cuts off visceral *efferent* nerves, and relieves the pain by altering the blood supply to the uterus. It is possible that stilbæstrol and other hormones produce their beneficial results in a similar manner. There is, moreover, no doubt that spinal manipulation, psychological treatment, and even falling in love may suffice to cure this pain, for a time.

Primary dysmenorrhœa is invariably cured by child-birth, and when simple measures fail I believe the best results are obtained by dilating the cervical canal up to the largest size of Hegar's dilators, and then packing the canal with sea-laminaria tents. These should be removed twenty-four hours later. This operation requires considerable skill and experience and should not be lightly undertaken.

#### PAIN ASSOCIATED WITH CERVICITIS, LOW ABDOMINAL PAIN, BACKACHE, DYSPAREUNIA AND SECONDARY DYSMENORRHŒA

The grouping of these diverse and very common complaints into one heading reveals the reorientation of gynæcological concepts which would occur if pain were regarded as an entity. Professor James Young has been the chief exponent in this country of the ills which may be associated with chronic cervicitis. His contentions have been largely disregarded because so little has been known about the sympathetic nervous system. I believe the concept he has championed to be one of the most important in gynæcology and am of the opinion that adequate cauterization of the cervix is capable of relieving more pain and discomfort peculiar to women, labour pains excepted, than any other procedure.

Infection pocketed in the crypts of the cervical mucosa, perhaps the most common focus of infection in the female body, may cause arthritis and all the other manifestations associated with any focus of infection in the body.

In cervicitis, movement of the cervix in any direction frequently causes pain, although in some cases pain is only associated with its movement in one direction. Pain thus elicited is a not uncommon cause of dyspareunia. Cervicitis is often associated with frequency and urgency of micturition, secondary dysmenorrhœa, chronic ovarian pain, and often with backache. These symptoms are frequently relieved, particularly the frequency of micturition, by cauterizing the cervix. It might be assumed, and with reason, that these good effects result from the cleaning up of an infection which may extend from the cervix into neighbouring structures. That this is by no means the whole story is proved by the fact that similarly beneficial results may be obtained by cauterizing an apparently healthy cervix. Conversely, women with the most gross cervicitis may not complain of any symptoms.

When a woman complains of any of the above symptoms, and no gross pathological conditions are discovered, it is my practice to put them on an appropriate hormone therapy, often together with lactic acid pessaries. Advice concerning ordinary hygiene, diet and exercise is also given. Iron

and hypnotics may be necessary in addition. If they are no better at the end of a month I cauterize the cervix, even though it appears perfectly healthy. The cervix is dilated up to 10/12 Hegar's dilator and cauterized with the silver stick. The vagina is then packed with a mixture of flavine and paraffin.

By these means some 50 per cent. of women are cured of the above pains. Laparotomy is resorted to when these measures fail. It must be borne in mind that left-sided pain may persist in the presence of chronic constipation, and that subacute appendicitis may exacerbate pain in the right lower abdomen.

#### BACKACHE ASSOCIATED WITH PROLAPSUS UTERI

If this pain is not relieved, both by rest in bed and by the insertion of a well-fitting pessary, it may be asserted that it is not entirely due to dragging on the peritoneum. In the absence of gross pelvic pathology it is essential that the patient should be examined by an orthopædic surgeon. It may be observed that traction applied to the cervix by a volsellum may cause a sharp stab of pain referred to the front of the abdomen in the bladder region.

#### PAIN ASSOCIATED WITH SALPINGITIS AND TUBO-OVARIAN ABSCESS

The introduction of penicillin and the sulphonamide group of drugs has finally excluded any justification for surgical intervention in acute inflammatory conditions involving the Fallopian tubes and ovaries. The pain may be most successfully relieved by infiltrating the cutaneous branches of the 1st lumbar nerve with some local anæsthetic. Here again the desirability of a safe local anæsthetic with a prolonged action is evident.

#### PAIN ASSOCIATED WITH PELVIC TUMOURS

Any pelvic tumour may cause pain in a number of ways, and particularly when it gives rise to adhesions. The pain may be wholly of a referred nature or may arise in part in structures supplied by somatic nerves. It is perhaps worth stressing that a benign tumour, such as an ovarian cyst of moderate size, may cause pain radiating down the whole of one side, both anteriorly and posteriorly.

#### DYSPAREUNIA

The pain arising during deep penetration of the penis from cervicitis has been mentioned, and that due to a tender ovary or endometriosis may be regarded as belonging to a similar category. Bartholinitis or any other sore area at the entrance of the vagina is an obvious cause of dyspareunia and is easily treated. Vaginismus is a condition in which involuntary spasm of the sphincter not only causes intense pain but makes sexual intercourse im-

possible. Vaginismus is not always cured by child-birth, but almost invariably responds to psychotherapy, often of a very elementary nature.

#### PAIN WHICH IS NOT EXACERBATED DURING MENSTRUATION

Whereas any pain to which a woman is subject may appear to be exacerbated during, or immediately before or after, the menstrual flow, it may be asserted that pain which is not exacerbated does not arise in any pelvic organ. This is a most important diagnostic criterion. Pain associated with pyelitis, ureteral calculus and subacute appendicitis may be uninfluenced by the menstrual cycle. There are, however, other conditions which give rise to pain which are as easily treated as they are missed.

Many patients have been referred to me with pain in the breast, and a tentative diagnosis of carcinoma. Not infrequently it is found that the pain is strictly localized to a rib underlying the mamma and is due to a torn tendon. This pain can be abolished by injecting the area with a solution of local anæsthetic.

During pregnancy it not infrequently happens that the woman complains of a sharp pain on one or other side of the abdomen, which persists. If it happens to be on the right side a diagnosis of appendicitis is frequently made. On careful examination the tender area is found to be on the wall of the uterus, often in the neighbourhood of the round ligament. The pain is abolished, often permanently, by anæsthetizing the cutaneous area involved. The pain may be associated with a small degenerating fibroid, in which case conservative treatment with penicillin and the drugs of the sulphonamide group usually suffices.

The pain of which a woman complains may be over the ovarian region but due to a "pulled tendon" of the abdominal musculature. Pain not infrequently occurs at the site of the insertion of the adductor longus muscle to the pubic ramus. This pain radiates down the labium major of the same side right into "the privates". Proctocaine is a suitable local anæsthetic for these types of pain, for which small quantities suffice.

Pain must be regarded as an entity and this conception will involve a new approach to gynæcological problems. It is as easy (and sometimes very cruel) to stigmatize a woman as neurotic, as it is difficult to find and cure the cause of her pain.

A solution of local anæsthetic and suitable syringes are almost as indispensable in the gynæcological out-patients' department as a Sims's speculum.

From time immemorial the pain associated with child-birth has been employed by poets and writers to typify anguish and disaster, and it is therefore appropriate that the modern gynæcologist should be in a better position than any other clinician to contribute to the study of the profound problem of pain.

# REVISION CORNER

## THE TREATMENT OF EPILEPSY

THE treatment of epilepsy is a twofold problem: the education of the patient in the nature of his complaint, and the measures to be taken to reduce the number of fits to a minimum.

### EDUCATION OF THE PATIENT

It is essential at the outset that the patient be made aware of the nature of his fits; it is upon this that the success of treatment largely depends. It should be emphasized that the sufferer from epilepsy is not in any way debarred from normal society and that no stigma is attached to the term epilepsy.

False hopes of an ultimate cure should not be raised; indeed it is better that the patient should realize that the tendency to have fits may be permanently present and that in consequence certain modifications in his or her way of living are necessary. It should be pointed out that the taking of medicine or tablets is intended to reduce the tendency to have an attack, the treatment having no intrinsic curative properties. The necessity for complete regularity in treatment should be stressed, and the patient should be warned against quack remedies and cures.

In the case of *children* the parents should be carefully instructed, and every effort should be made to ensure that the child receives normal schooling, with only those restrictions necessary for the child's own safety. It is, of course, desirable to obtain the close cooperation of the school authorities. It is only in those children in whom mental deficiency is evident, or in those whose fits are very numerous and difficult to control, that it may be desirable that the child be sent to a special school for defectives, or other residential institution.

There are certain general principles in the treatment of epilepsy, the careful observance of which by the patient may materially help to reduce the number of attacks. Regular habits are essential, in particular in regard to sleep. Excessive fatigue should be avoided so far as possible. Moderate amounts of alcohol may be taken unless it is found in the individual patient that this increases the likelihood of a seizure. Meals should be regular, but no special diet is indicated. Constipation must be avoided.

The epileptic should not drive a car, ride a bicycle, swim or climb, nor should he be employed on heights, ladders, or near any unguarded machinery. The patient should in fact avoid all situations in which the occurrence of a fit would endanger himself or others. These remarks apply equally to major and to minor epilepsy.

### CONTROL OF ATTACKS

Broadly speaking, the same drugs are used in the treatment of both major and minor epilepsy. As a general rule the control of major epilepsy is much easier than that of the minor variety, which not infrequently is almost uninfluenced by any form of treatment.

Two groups of drugs are in common use and are of proved value; bromide salts and various barbituric acid derivatives. Other substances, such as belladonna and borax, are often used as adjuvants and are at times of benefit.

*Bromides*.—It has been the practice in the past to begin treatment with bromides, adding or substituting barbiturates if inadequate control is obtained. The present trend, however, is to proceed to the latter at the outset. Bromide is usually administered as the potassium or the sodium salt; the latter is preferable. A normal adult dose is 7 to 10 grains (0.45 gm. to 0.65 gm.), thrice daily, but this may be increased up to a total of 40 grains (2.6 gm.) in twenty-four hours, if necessary. It is usual to include in the mixture 1 to 2 minims (0.06 to 0.12 c.cm.) of Fowler's solution in each dose, which is said to decrease the tendency towards a bromide eruption. It must be borne in mind that the long-continued use of bromide salts may produce

possible. Vaginismus is not always cured by child-birth, but almost invariably responds to psychotherapy, often of a very elementary nature.

#### PAIN WHICH IS NOT EXACERBATED DURING MENSTRUATION

Whereas any pain to which a woman is subject may appear to be exacerbated during, or immediately before or after, the menstrual flow, it may be asserted that pain which is not exacerbated does not arise in any pelvic organ. This is a most important diagnostic criterion. Pain associated with pyelitis, ureteral calculus and subacute appendicitis may be uninfluenced by the menstrual cycle. There are, however, other conditions which give rise to pain which are as easily treated as they are missed.

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Pain must be regarded as an entity and this conception will involve a new approach to gynecological problems. It is as easy (and sometimes very cruel) to stigmatize a woman as neurotic, as it is difficult to find and cure the cause of her pain.

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The above treatment of epilepsy refers only to the idiopathic form, although the same general principles apply to the treatment of fits which are a manifestation of organic disease, and may be used to supplement the treatment of the primary condition present.

DAVID KENDALL, D.M., M.R.C.P.

## THE CHOICE OF IRON PREPARATIONS

IRON has been used in the past in a bewildering number of prescriptions, in so-called tonics and in elaborate and often expensive proprietary preparations. It is now generally agreed that tonics owe their efficacy, except when they happen to supply some particular deficiency, to suggestion rather than to any pharmacological action. Further, it can be stated categorically that expensive proprietary preparations of iron and blunderbuss hæmatinic pills containing iron, liver and other preparations are all less efficient in the treatment of iron deficiency anæmia than are the simple and inexpensive iron salts.

### SOLUTION FOR INJECTION

Iron has often been administered by injection, in the vague faith that an injection must be more powerful than a pill or a mixture, and the B.P. contains an injection of iron consisting of iron and ammonium citrate for intramuscular injection in doses of 15 to 30 minims (0.9 to 1.8 c.cm.). For a patient of average blood volume the raising of the hæmoglobin level from 35 to 100 per cent. involves the manufacture of some 500 gm. of hæmoglobin and this requires 1,500 mgm. of metallic iron. Thirty minims of the injection of iron (B.P.) contain 7 mgm. of metallic iron, and although this dose could probably be doubled without producing toxic symptoms, the injection of larger doses of iron in any form will produce disagreeable and even dangerous symptoms, including palpitation, præcordial discomfort, nausea and vomiting. It is evident therefore that the injection of iron in such forms as this can have no place in the rational therapy of anæmia.

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- (2) Ferrous salts, e.g. ferrous sulphate (B.P.), pills of iron carbonate, B.P. (or Blaud's pill), and saccharated iron carbonate (B.P.).
- (3) Ferric salts forming simple ions, e.g. solution of ferric chloride (B.P.).
- (4) Ferric salts forming complex ions, e.g. iron and ammonium citrate (B.P.) and iron and quinine citrate (B.P.).
- (5) Organic iron combinations.

Numerous studies have shown that inorganic ferrous salts are weight for weight



symptoms of bromism: increasing lethargy and drowsiness, loss of appetite, furred tongue, constipation, slurred speech and, finally, delirium and coma. If this complication is suspected all bromide must be withdrawn and sodium chloride administered by mouth, with intravenous saline if necessary. The prolonged use of Fowler's solution may produce evidence of chronic arsenical poisoning, in particular, a cutaneous rash and pigmentation, and it is advisable only to include this in the mixture in alternate months.

Of the *barbiturates*, phenobarbitone (luminal, gardenal) is the most widely used. This is given in doses of 0.5 grain (32 mgm.) to 1.5 grains (0.1 gm.) t.d.s., to an adult patient. Children are quite tolerant of phenobarbitone and it is safe to administer it to infants as young as three months in doses of  $\frac{1}{2}$  grain (8 mgm.) twice or thrice daily. Toxic effects of phenobarbitone are uncommon and manifest themselves by drowsiness, a morbilliform or erythematous rash or, more rarely, dizziness and ataxia. These symptoms are usually relieved by a reduction in dosage. Phenobarbitone may be combined with bromide in a mixture if the soluble sodium salt is used. This has the disadvantage of instability, and if it is desired to give both drugs it is better to give them separately.

When the fits are inadequately controlled by phenobarbitone, methalonyl (prominal) may prove effective in doses of 1 to 3 grains (65 mgm. to 0.2 gm.), twice or thrice daily.

Recently a new barbiturate, sodium diphenyl hydantoinate (epanutin, dilantin) has been extensively used, both alone and in combination with phenobarbitone. The combination is usually the more effective. Diphenyl hydantoin is given in individual doses of 1.5 grains (0.1 gm.), and it is unwise to give this dose more than four times in twenty-four hours. When used in combination with phenobarbitone a suitable dosage would be diphenyl hydantoin, 1.5 grains (0.1 gm.) t.d.s., with phenobarbitone  $\frac{1}{2}$  grain (32 mgm.) t.d.s., with correspondingly smaller doses for children. This drug may produce toxic symptoms—diplopia, vertigo, ataxia, nausea and skin rashes; these symptoms usually respond to a reduction in dosage.

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In recent months a new barbiturate, 3,5,5-trimethylloxazolidine-2,4-dione (tridione), has been introduced into this country following successful trials in the United States. This drug, administered in doses of 0.3 gm., three or four times daily, has proved very effective in the treatment of minor epilepsy, and preliminary trials in this country tend to confirm this, but it is too early to draw definite conclusions. Toxic effects include gastro-intestinal irritation and photophobia, which are an indication for reduction in dose or withdrawal of the drug. It should not be administered in the presence of renal or hepatic insufficiency.

In a number of patients the attacks tend to occur at certain definite times. In these cases suitable adjustment of the timing of drugs is indicated. In the case of nocturnal epilepsy a larger dose should be taken at night than in the morning. In some female patients attacks occur only at the time of the menses, and provided that the time of the menses is exactly known it is justifiable to give treatment only for the few days before the fit is to be expected. This, however, places a burden upon the patient's memory and intelligence and is therefore not always applicable.

#### TREATMENT OF THE ATTACK

The treatment during a fit consists of measures to prevent the patient injuring himself, and steps should always be taken to prevent biting of the tongue by the use of a suitable gag. The wise patient provides himself with a hard rubber gag, and may be able to apply it himself should his fits be preceded by a definite aura.

Mention must be made of the treatment of *status epilepticus*, since it is not com-

monly realized that this is a very dangerous condition, having a mortality of 20 to 30 per cent. The patient must be put to bed in a quiet darkened room with the minimum of handling, and should be brought as quickly as possible under the influence of barbituric drugs. An effective method is to administer slowly 0.5 gm. (7.5 grains) of sodium amytal intravenously, and follow this immediately with an intramuscular injection of an oily phenobarbitone solution, 3 grains (0.2 gm.), the latter to be repeated in four hours. An enema should be given, and further sedation if required can be obtained by the use of paraldehyde, 240 to 480 minims (14 to 28 c.cm.), per rectum. Inhalation of anæsthetics and the administration of morphine are not advisable. Usually the fits will cease rapidly with this regime, and when the patient becomes conscious large doses of phenobarbitone should be continued by mouth, to be reduced to a more normal dose, over a period of days.

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more efficient in the repair of anæmia than iron in any other form. Ferrie salts are less effective, although iron and ammonium citrate is useful because it is not astringent and is stable in solution. Organic iron combinations are useless. *Reduced iron* is effective but has to be taken in very large doses. In fact the variety of preparations of iron provided by the B.P. is quite unnecessary, and for all practical purposes the selection of a preparation for use in anæmia resolves itself into a choice between ferrous sulphate or carbonate and iron and ammonium citrate.

*Ferrous sulphate* is effective in doses of from 9 to 18 grains (0.6 to 1.2 gm.) a day. It is best given in tablet form, as in mixtures it tends to become oxidized to a ferrie form and therefore less active. The N.W.F. contains a ferrous sulphate tablet containing 3 grains (0.2 gm.) of ferrous sulphate. Various proprietary preparations [e.g. *fersolate* (Glaxo) and *ferosan* (Boots)] are available in coated tablets containing 3 grains (0.2 gm.) of ferrous sulphate and traces of manganese and copper. One tablet three times a day, i.e. 9 grains (0.6 gm.) a day, is often sufficient, but if any doubt exists six tablets a day should be given. Probably on account of their coating these tablets rarely give rise to digestive symptoms, but may occasionally produce some constipation or diarrhœa. They are free from most of the objections to *Blaud's pill*, to be mentioned below, and in practice are most satisfactory. They must, however, be kept out of the reach of young children, who have occasionally mistaken them for sweets, with disastrous results.

*Iron and ammonium citrate* is stable in solution and can be used when a mixture is desired. It should be tried in the rare cases in which ferrous sulphate tablets produce digestive disturbances. The effective dose is from 60 to 90 grains (4 to 6 gm.) a day and it may be prescribed as follows:—

Iron and ammonium citrate .....	30 grains (2 gm.)
Chloroform water .....	to $\frac{1}{2}$ fluid ounce (14.2 c.cm.)

The taste is not objectionable, but may be improved by adding 30 minims (1.8 c.cm.) of glycerin or syrup of orange to each dose. To avoid staining of the teeth and tongue the mixture may be sucked through a straw or glass tube.

*Pills of ferrous carbonate* (*Blaud's pill*), in doses of from 60 to 90 grains (4 to 6 gm.) a day, are effective with certain reservations. If not freshly prepared the iron may become oxidized, and the pill may become so hard that it is passed unaltered in the stools. These difficulties can be overcome by preparing it in an oily base and putting it up in gelatin capsules.

*Saccharated iron carbonate powder* is also effective in doses of 60 to 90 grains (4 to 6 gm.) a day, and can sometimes be taken by patients in whom the other preparations mentioned produce dyspeptic symptoms.

#### ADMINISTRATION TO INFANTS

Iron may be given to infants as iron and ammonium citrate added to the milk or in the following prescriptions, 60 minims (3.6 c.cm.) to be taken three times a day:—

Iron and ammonium citrate .....	4 grains (0.25 gm.)
Syrup or glycerin .....	10 minims (0.6 c.cm.)
Water .....	to 60 minims (3.6 c.cm.)

or

Ferrous sulphate .....	1½ grains (0.1 gm.)
Dilute hypophosphorous acid .....	$\frac{1}{4}$ minim (0.015 c.cm.)
Dextrose .....	15 grains (1 gm.)
Chloroform water .....	to 60 minims (3.6 c.cm.)

The dextrose and hypophosphorous acid in the latter prescription are said to prevent oxidation of the ferrous sulphate for at least three months at ordinary temperatures.

Many clinicians believe that preparations of iron are more effective if ascorbic acid, 50 mgm. t.d.s., is prescribed at the same time. This may well be so, either

because a coincident vitamin C deficiency may be partly responsible for the anaemia, or because ascorbic acid, as a strong reducing agent, serves to keep the iron in the ferrous form and so aids in its absorption.

R. R. BOMFORD, D.M., F.R.C.P.

## THE TREATMENT OF PYELITIS AND CYSTITIS

THERE is little new to report concerning the treatment of urinary infections. The advent of penicillin has not affected the routine treatment of cases of pyelitis and cystitis, although it has revolutionized that of staphylococcal disease of the kidney and perirenal tissues. Perinephric abscess and renal carbuncle can be effectively treated by parenteral penicillin and, if diagnosed at an early stage, operative interference may be avoided. Penicillin, in high doses, may occasionally clear an infection of the urinary tract due to *Bacillus proteus*, an organism resistant to all the usual urinary antiseptics; but preliminary reports from America suggest that streptomycin, when available, may well prove the ideal treatment for such infections.

### URINARY ANTISEPTICS

In the routine treatment of cystitis and pyelitis, three main groups of urinary antiseptics are used:—(1) The sulphonamides; (2) the salts of mandelic acid; and (3) hexamine.

The sulphonamides are now most widely used. They have several great advantages. First, an adequate concentration of the drug in the urine can be obtained by giving relatively small doses by mouth; secondly, the drugs are effective in alkaline urine and can conveniently be given in association with alkalis to patients in the febrile stage of an acute urinary infection. Owing to the ease with which a high urinary concentration can be obtained, there is no need for drastic reduction of the fluid intake, which should, in fact, be well maintained. The sulphonamides, as a class, are effective in infections due to most gram-negative bacilli, but fail to sterilize urinary tracts infected with *Bacillus proteus* and similar organisms. Staphylococcal infections often respond well, but the *Streptococcus faecalis* is usually resistant. There is little to choose between the different sulphonamide compounds. Sulphanilamide itself, with its tendency to produce cyanosis, and sulphapyridine with its associated nausea, have become less popular, and sulphathiazole, sulphadiazine and sulphamezathine are now most commonly prescribed. Sulphadiazine is readily excreted in the urine and is able to produce a satisfactory urinary concentration in small dosage and also in the presence of moderate renal failure, and this drug has been recommended for use in the presence of impaired renal function. Sulphamezathine is probably similarly effective. In the routine treatment of urinary infection, a dosage of 1 gm. (2 tablets) four times a day is usually sufficient, and should be given in association with an alkaline mixture and a fluid intake of not less than four pints a day. A course lasting for six to ten days is usually adequate to cure acute infections and also to sterilize the urinary tract in chronic infections, in the absence of complicating factors. If it proves necessary to give repeated courses, watch should be kept on the white cell count. Complications due to the crystallization of acetyl derivatives in the urinary tract are unlikely to occur with this small dosage, provided the fluid intake is well maintained.

The mandelates, especially calcium and ammonium mandelate, are still fairly widely used. They are only effective in an acid urine, but since both the above salts are urinary acidifying agents, it is rarely necessary to give any additional ammonium chloride to the patient. The drugs are given in a dosage of 3.5 gm. four times a day, and, in order to obtain an effective urinary concentration, the fluid intake is normally limited to two pints a day. After two to three days' treatment an early morning specimen of urine should be tested with methyl red indicator solution. This should

give a pink colour, indicating a satisfactory pH (below 5.3). If a sufficient degree of acidity is not obtained, 1 or 2 gm. of ammonium chloride may be given daily, but the failure to produce an acid urine may be due to infection with a urea-splitting organism, such as *Bacillus proteus*, or to the presence of renal failure, when the kidneys may be unable to form an acid urine. Both these conditions are contraindications to the use of mandelates. Mandelic acid is effective against the coliform bacilli, against *Staphylococcus albus* and against the *Streptococcus faecalis*, and is the drug of choice in the treatment of infections due to the latter organism. The usual course of treatment lasts for one to two weeks.

Hexamine and its various derivatives owe their bactericidal effect to the liberation of formaldehyde in acid solutions, and the urine must therefore be rendered acid by the simultaneous administration of either acid sodium phosphate or ammonium chloride. The usual dose of hexamine is 15 to 30 grains (1 to 2 gm.), three times a day. If the urine is too alkaline little bactericidal effect is obtained, whilst if too acid an excessive liberation of formaldehyde may irritate the urinary tract and cause hæmaturia. The formaldehyde is only formed after the drug is excreted in an acid urine, and, if active urinary secretion is occurring, little bactericidal action will result at the level of the renal pelvis. The longer the urine is retained, the more formaldehyde is liberated; hence the popularity of this drug among urologists in cases of lower urinary obstruction with residual urine. In such cases, and in neurological cases with bladder disturbance, it is used both for therapy and for prophylaxis. It is not, however, as effective an agent as the sulphonamides or mandelates in the treatment of an established infection.

Whatever urinary antiseptic is used in the treatment of a urinary infection, and the choice will depend upon the type of case, the infecting organism and the personal preference of the doctor, it is essential to check the result of treatment by bacteriological examination of the urine. If the infection has been eradicated, a catheter or clear specimen of urine, taken three days after all treatment has ceased, should be sterile on culture. Successful cure can only be expected in the absence of any underlying cause of urinary stasis, and the failure to cure either an acute or chronic infection is most often due to some complicating factor such as calculus, hydronephrosis or lower urinary tract obstruction. Other causes of failure are first, the nature of the infecting organism, and secondly, the presence of renal failure. This renal failure may not be detectable by the usual means, for it may be only unilateral. The urine from the infected kidney may contain a low concentration of the drug and may never reach the desired degree of acidity while the sound kidney is able to maintain normal renal function. Failure to cure a urinary infection by drugs is thus an indication for a full investigation of the urinary tract and, following the surgical correction of underlying abnormalities, the infection may respond to treatment.

In the fulminating acute urinary infection, alkalization of the urine by the administration of citrates and bicarbonates is effective in relieving the general symptoms, but rarely cures the infection. Sulphonamides are therefore usually given at the same time. In chronic infections which fail to respond to treatment, and in which the underlying disease cannot be eradicated, citrates are no longer given over long periods in the hope of keeping the infection in check. Small doses of sulphamezathine, such as 0.5 gm. twice a day, and a large fluid intake, will usually control the infection and prevent febrile relapses, without producing any toxic effects.

M. L. ROSENHEIM, M.D., F.R.C.P.

## NOTES AND QUERIES

### *The Treatment of "Wandering".*

#### *Phlebitis*

QUERY.—A male patient, aged fifty-five, has been in bed since August 18, 1946, with the "wandering" type of phlebitis of both legs. The condition began in the left external saphenous vein, then moved to the right external saphenous, and has since involved in turn both internal saphenous veins in varying parts of their courses from the internal malleoli to the middle third of the thigh, the venæ comites of the anterior tibial, and the veins accompanying the articular branches around the knee joints. None of the areas involved has proceeded to suppuration, although in some places the skin has become red and brawny and persisted for two to three weeks; in the smaller veins the condition may only have caused pain and discomfort for perhaps twenty-four to thirty-six hours. There is no oedema of the legs or ankles now, although at one time this was present to some degree. The treatment has been rest in bed and hot fomentations and, for a certain period of time, the giving of an alkaline citrate mixture. This latter was given more because the patient "expected a bottle of medicine" than for any other reason! I would be grateful for any help and advice.

REPLY.—The fact that wandering phlebitis has affected the legs only should direct attention to the state of the pelvis because any disease here, which might cause partial obstruction of venous flow, would determine the site of the phlebitis. If no tumour can be detected, and if X-ray of the lumbo-sacral spine and pelvis is normal, we are left with one of two possible causes. The most common is infection, usually derived from a dental focus. Often, however, the source of the infection is never found, although its presence is presumed if the phlebitis be accompanied by pyrexia. The second cause which must be seriously considered in a man of this age is small deposits of growth in the walls of the veins. This can give rise to a picture indistinguishable from that of thrombophlebitis migrans. I have seen it in connexion with two cases of carcinoma of the bronchus, one of carcinoma of the rectum, and one of the pancreas. A section of the affected vein, if examined microscopically will show the malignant cells actually embedded in the wall with a clot around them. Apart from a careful general overhaul I should therefore recommend X-ray examination of the lungs and, of course, a rectal examination.

As to the actual treatment of phlebitis, whatever the cause it is justifiable in view of its activity to give an anticoagulant, although should

a growth be at the root of the trouble this would be a waste of time. When seen in the first stages heparin should be given intravenously, 200 units per kgm. of body weight, four-hourly for two days. Dicoumarol should be given by mouth, starting at the same time. There is a lag of forty-eight hours before it starts to act and when it does so its effect will be shown by prolongation of the prothrombin time. Heparin may then be stopped; the dicoumarol continued. The aim is to prolong the prothrombin time by a little over 100 per cent. This treatment is not safe unless the assistance of an expert hæmatologist is available.

A. H. DOUTHWAITE, M.D., F.R.C.P.

### *The Treatment of Chronic Indolent Ulcer*

QUERY.—I have a patient, aged seventy-three, who has a chronic ulcer on the inside of his left great toe, of over two years' standing, and for whom I would be grateful for suggestions for treatment. He also has a chronic generalized rheumatoid arthritis and chronic pemphigus vulgaris of his scalp and front of the chest. A culture was made from a swab taken from the toe ulcer and revealed the presence of a mixed growth of *Staph. aureus* and hæmolytic streptococci, with a heavy growth of *B. coli*. The staphylococci and streptococci were penicillin-sensitive; the *B. coli* were penicillin-resistant. The ulcer was dressed with penicillin cream. Sulphathiazole tabloids were given at the same time, but they appeared to cause an acute dermatitis of the back of the foot. Allantoin-sulphanilamide preparations were also tried with the same result and numerous other ointments have been used. There is no sugar or albumin in the urine. The patient had pulmonary tuberculosis a good many years ago but is completely cured. He has taken aspirin for years to relieve the rheumatoid arthritis. Any suggestions as to the treatment of the chronic pemphigus would also be gratefully received.

REPLY.—For the ulcer I should try moist dressings of mercury perchloride, 1/4,000 in 1 per cent. saline, during the day and the application of aqueous gentian violet, 1 per cent., and a dry dressing at night. Indolent low-grade infective ulcers often do better with this combination than with ointments or other greasy local treatment. The ulcer, however, may be of the trophic type associated with a poor peripheral circulation or arteriosclerosis. Or healing may have been prevented by constant friction of the adjoining toe surface, so that the lesion has



give a pink colour, indicating a satisfactory pH (below 5.3). If a sufficient degree of acidity is not obtained, 1 or 2 gm. of ammonium chloride may be given daily, but the failure to produce an acid urine may be due to infection with a urea-splitting organism, such as *Bacillus proteus*, or to the presence of renal failure, when the kidneys may be unable to form an acid urine. Both these conditions are contra-indications to the use of mandelates. Mandelic acid is effective against the coliform bacilli, against *Staphylococcus albus* and against the *Streptococcus faecalis*, and is the drug of choice in the treatment of infections due to the latter organism. The usual course of treatment lasts for one to two weeks.

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M. L. ROSENHEIM, M.D., F.R.C.P.

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FRANKIS EVANS, M.B., D.A.

### *urethane in the Treatment of leukæmia*

QUERY.—Could you inform me of the details of the urethane treatment of leukæmia, with indications as to suitable cases and the prognosis.

REPLY.—The urethane treatment of leukæmia at the present time is under investigation from the point of view of immediate results and the ultimate long-term effects on the prognosis. The best responses are obtained in the chronic myeloid leukæmias in which the initial white cell count is high; the chronic lymphatic leukæmias do not respond quite so well, whilst the acute leukæmias do not show any improvement at all under urethane therapy.

The treatment must be applied cautiously because of the profound influence urethane has on the white cells, particularly the myeloid cells. The dosage is usually 2 to 3 gm. a day, occasionally 4 gm. may be necessary, given usually in divided doses and perhaps more conveniently in the form of a syrup after meals. The white cell count must be done twice weekly during this treatment, and as it falls to about fifty to eighty thousand, treatment should be discontinued, the white cell count still being done twice or three times weekly until the lowest level of total white cells has been reached. This may be quite low as the white cells fall steadily in most cases after discontinuance of treatment, often reaching only a few thousands. Subsequently no treatment is needed until the white cells begin to rise to forty thousand or more when treatment can be started cautiously once again with 1 gm. a day, but discontinued as the white cells begin to fall. It cannot be emphasized too strongly that urethane has a very marked effect on the total white cell count (particularly the myeloid cells) bringing it down very rapidly to low levels. Care must be exercised not to overdose the patient, as agranulocytosis may result.

F. J. WILKINSON, M.D., F.R.C.P.

### *Dandruff*

QUERY.—I would be glad if you could tell me some reliable method of getting rid of dandruff. I have had it for many years. At one time it was checked by, if I remember rightly, some licylic and sulphur lotion, but is now worse than ever, and various antiseptic washes, such as

dettol, have proved quite useless.

REPLY.—Dandruff is most likely to be part of a seborrhœic state. It is therefore important to ensure that the general health is satisfactory, that there are no active septic foci—teeth, tonsils, gut—and that the diet is well balanced. Excess of carbohydrate should be avoided and it is a good plan to take extra doses of vitamins A, B, and C, either separately or in the form of "multivite", 2 capsules morning and evening. A good plan is to start local treatment after a shampoo and hair cut, then apply the following lotion morning and evening for four days:—

Mercuric chloride .....	$\frac{1}{2}$ grain (16 mgm.)
Glycerin .....	5 minims (0.3 c.cm.)
Distilled water .....	to 1 ounce (18.4 c.cm.)

On the fifth day apply:—

Precipitated sulphur .....	10 grains (0.65 gm.)
Soft soap .....	120 grains (8 gm.)
H.E.B. simplex .....	to 1 ounce (28.4 c.cm.)

Apply the same on the evening of the sixth day, and on the seventh day shampoo the head.

A regular brushing in the morning is a good plan and head gear should be worn as little as possible.

E. MITCHELL-HEGGS, M.D., F.R.C.P.

### *Heredity and Deaf-Mutism*

QUERY.—A patient of mine is engaged to be married to a young man both of whose parents have been deaf and dumb since birth. A brother and sister of the man are married; they both have several normal children. This patient is anxious to know if any children of her marriage are likely to be affected.

REPLY.—I am afraid that the answer to your correspondent's question about the heredity of deaf-mutism is not a very simple one. The subject is discussed on pages 4 and 5 of the new edition of Garrod, Batten and Thursfield's "Diseases of Children." Briefly it is as follows: true hereditary deaf-mutism is inherited as a Mendelian recessive character. Strictly speaking one would therefore expect that the children of the deaf-mute parents would also be deaf, but I gather that in this case they are all normal; it is not clear from the question whether this is so. This suggests that the parents are not true hereditary cases or at any rate that there is a difference in their type of deafness. Even if the young man were carrying the recessive gene the young woman would also have to be carrying it to produce deaf children. In view of the comparative rarity of hereditary deafness this is most unlikely. The short answer would therefore seem to be that the risk is very small but one could not say that it is entirely non-existent.

A. H. GALE, M.D.

become soggy and ulcerated. A Wassermann test should be done.

As regards the patient's other skin trouble I rather doubt the diagnosis of "chronic pemphigus vulgaris" of the scalp and front of chest. True pemphigus does occasionally occur in an indolent form in elderly subjects but I would not expect the blisters to confine themselves to certain areas for a long period. I would have this diagnosis confirmed or otherwise by a dermatologist. In the meantime, as the eruption presumably is of a vesicular or bullous kind, I should keep the lesions dry so far as possible, e.g., with aqueous silver nitrate,  $\frac{1}{4}$  per cent, or only calamine lotion containing argyrol,  $\frac{1}{4}$  per cent.

E. W. PROSSER THOMAS, M.D.

### *Read's Formulæ for the Estimation of B.M.R.*

QUERY.—I would be grateful for information in regard to Read's formula for estimating the basal metabolic rate from the pulse pressure and pulse rate. I gather that it is quite useful in the case of the young thyrotoxic patient. Is it of any value in other types of case when it might be useful to have a rough guide to the B.M.R.?

REPLY.—Thyrotoxicosis is a disease not uncommonly associated with an increased pulse rate and pulse pressure (systolic minus diastolic pressure), or one or the other. Read's formula is based on such assumptions. Two formulæ were suggested by him—(1) In 1922 (*J. Amer. med. Ass.*, 1922, 78, 1887) B.M.R. equals 0.683 (pulse rate  $\div$  0.9 pulse pressure) — 71.5 (2) In 1924 (*Arch. int. Med.*, 1924, 34, 553) B.M.R. equals 0.75 (pulse rate  $\div$  0.74 pulse pressure) — 72. It will be seen that the pulse rate plays a more prominent part in the formulæ, particularly the second one, than does the pulse pressure, and in addition it may be assumed that the pulse rate is roughly twice the pulse pressure.

The value of any formula, test or investigation, depends upon its reliability and specificity. The basal metabolism is of value in the diagnosis of thyrotoxicosis because it is always raised above the healthy subject's basal rate and is always affected in some manner by iodine. As an index of the basal metabolism, Read's formula has been found, by several investigators, including myself, to be disappointing. (1) It agrees within 10 per cent of the measured basal metabolism in only 50 per cent of cases. (2) Tachycardia produced by heart failure, arrhythmias, autonomic imbalance, and the like, and the increased pulse pressure of aortic regurgitation, are obvious sources of error. (3) A rapid pulse is not invariably present in thyrotoxicosis. Thus I have seen, to take a few examples, basal

rates of + 50, + 43, + 34, + 26, with rates of 84, 88, 74, and 80, respectively.

In summary it may be said that while tachycardia and an increased pulse pressure are useful clinically in confirming the presence of thyrotoxicosis, their introduction into a formula cannot act as a substitute for the basal metabolism. It is suggested instead that the presence of a pulse rate over 84, excluding its causes, under basal conditions is as useful a guide in diagnosing thyrotoxicosis as is the use of Read's formula. The pulse rate elevation in leukæmia doubtless explains some apparent correlation between Read's formula and basal metabolism in that disease.

J. DOUGLAS ROBERTSON, M.D., D.Sc., F.R.C.S.

### *Anæsthesia for Circumcision in Infants*

QUERY.—Apart from administering a general anæsthetic of "open ether", what is the best medication to give to an infant of about 1 to 4 weeks old for the operation of circumcision? In these days of staff shortage, nursing homes are reluctant to give facilities to operate at the optimum time of seven or eight days, and many practitioners find themselves obliged to arrange this operation when the mother and baby return home. I have tried chloral hydrate given in 1 and 2 grain (0.065 and 0.13 gm.) doses an hour before operation, reinforced by whisky during the operation, but have found the infant's movements most disconcerting, despite the efforts of a competent nurse.

REPLY.—If no general anæsthetic is to be given, the operation can be performed quite satisfactorily on a baby of the age of two to four weeks with the assistance of a good nurse. The nurse should sit opposite the doctor, and should hold the baby on her lap with the buttocks toward the surgeon. Her forearms are held across the child's thighs, and her hands grasp the legs, splavng the limbs apart. By this means it is possible to hold the baby quite still.

If inhalation anæsthesia is used, open ether can be administered, or gas-oxygen with breath or two of ether, but the rebreathing bottle must be rolled up so as to cut down rebreathing to a minimum. Many years ago I administered an anæsthetic of gas-oxygen-whisky to a patient and found it worked fairly well, but in the days of shortage I can almost hear the Colonel say "Waste of good liquor, Sir!"

As to a sedative to make the baby drowsy, I am loath to make any recommendation. Personally, I would prefer a little  $C_2E_2$  (by volume shaken on to a Barts' chloroform lint from Mills drop bottle). We found this most satisfactory in the past. There is no need to push the anæsthetic. Keep a small pupil, a good colour

and automatic breathing. The induction is slow, and one can change to ether as soon as the babe is under, if desired. I do not use this method now, as I have oxygen at my disposal, but your correspondent may not have this convenience.

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A. H. GALE, M.D.

## PRACTICAL NOTES

### *The Oral Administration of Penicillin*

Forty-nine patients with pneumococcal lobar pneumonia and eighty-one with miscellaneous infections due to penicillin-sensitive organisms were treated by oral administration of penicillin in primary doses of 200,000 units followed by 100,000 units three-hourly (W. S. Hoffman and I. F. Volini: *American Journal of the Medical Sciences*, May 1947, 213, 520). In 77 per cent. of the pneumonia cases there was subsidence of fever and toxic symptoms within forty-eight hours; in some within twelve hours. In the remaining 23 per cent. failure was attributed to inadequate absorption of the penicillin, the presence of penicillin-insensitive organisms or to overwhelming complications. A similarly good response was obtained in the patients with miscellaneous infections, which included cellulitis, bronchitis, acute tonsillitis, furunculosis, acute mastoiditis, acute sinusitis, infected wounds and post-operative thrombophlebitis. The plasma penicillin levels with oral administration were as a rule 0.06 unit per c.cm. or higher during most of the three-hour intervals between doses. No toxic reactions, apart from urticaria in a few cases, were noted. The tablets used were (1) crude calcium penicillin, 700 units per mgm., 25,000, 33,000 and 100,000 units per capsule or tablet; (2) the same, with pectin hydrolysate as a buffer, and in capsules or tablets of 25,000 units; (3) crystalline potassium penicillin, 1,510 units per mgm. in tablets or capsules of 100,000; (4) crystalline ammonium penicillin, 1,500 units per mgm., in tablets or capsules of 100,000; (5) crystalline potassium penicillin with different buffers or diluents, in tablets of 25,000, 50,000 and 100,000 units per capsule or tablet. It is stated that the severity of the infection bears no relation to the dosage of penicillin required, which must be based on the sensitivity of the organism to penicillin.

### *The Negative Tuberculin Test*

In reviewing the problem of the significance of the negative tuberculin test, B. Coutts (*British Journal of Tuberculosis*, April 1947, 41, 42) points out that part of the confusion in the past has been due to inadequate doses of tuberculin. If adequate doses are used, only a very small percentage of cases of clinical tuberculosis will fail to produce a reaction. Statistically this group is of little significance; from the clinical point of view it means that a definitely negative tuberculin test is a strong indication of the absence of clinical tuberculosis. In discussing the question of the permanence of positive re-

actions, attention is drawn to three factors which must always be borne in mind. The first is the lag period between the first infection and the development of skin allergy; this period is usually from four to seven weeks. In other words, particularly in dealing with young subjects, a skin test which is negative in a suspected individual should always be repeated after a few weeks. It is not considered that the usual doses of tuberculin used in this country are likely to desensitize the skin. Other factors that may produce a false negative reaction are advanced disease or toxic condition of non-tuberculous origin, measles, scarlet fever and aene. Apart from these factors, the conclusion is drawn that except possibly in old age when the skin tends to lose its reactivity, most reactions remain positive throughout life. This means that a tuberculin survey reveals practically all those who have been infected at any time and that the sensitization index is nearly equal to the attack incidence of tuberculous infection. The final question involved is whether or not negative reactions in adult life are sufficiently numerous to justify routine tuberculin testing. The answer given is that it is fully justified in children, adolescents and young adults. Reference is made to observations which indicate that "the chance of encountering negative reactions in young adults not suffering from clinical tuberculosis is substantial, and that it is clinically worth while to perform this test at least to the age of eighteen to twenty years approximately". Beyond this age it is probably only of clinical value in isolated communities.

### *The Diagnosis of Pott's Disease*

The importance of early diagnosis in Pott's disease is stressed by J. E. W. Brocher, of Geneva (*Praxis*, May 15, 1947, 36, 348). The evolution of the disease may proceed in one of three ways:—(1) A tuberculous spondylitis progressing with absence of apparent symptoms to a spontaneous cure by the welding together of two affected vertebrae. (2) A tuberculous spondylitis with non-characteristic and often misleading symptoms; for example, Pott's disease may simulate for a number of years a rheumatic condition, lumbago, sciatica, intercostal or brachial neuralgia, affections of the stomach, the appendix, the bladder, the genital organs, the pleura and so on. (3) The case with the usual classical symptoms and, in addition, pain on axial pressure. Pain is a frequent but not always constant symptom and is present more frequently in lumbar spondylitis than in that of the dorsal type. Pain on axial pressure, however, is a definite diagnostic sign. In the

child or adolescent lumbar rigidity is of particular diagnostic import, whereas in the adult it may be the sign of a degenerative disc lesion. X-ray examination is essential in all suspected cases, although it must be borne in mind that radiologically as well as clinically there is a latent period. For this reason if a first X-ray is negative the examination should be repeated in three or six months. The initial X-ray sign of greatest importance is the depression of a single intervertebral disc, a sign which is pathognomonic in the child or adolescent. The finding of a paravertebral shadow clinches the diagnosis of Pott's disease. When the disease has progressed the collapse of one or more vertebral bodies will be seen, with signs of a hump, scoliosis, and altered structure of the vertebrae, i.e. alternation of areas of decalcification with zones of calcification. Differential diagnosis includes spondylitis due to a previous infection, which a careful history will reveal, Bang's disease, the ankylopoietic spondylitis of Pierre Marie Bechterew (in which immobilization, the basic treatment of Pott's disease, is contra-indicated), Scheuermann's disease, vertebral block, Calve's osteonecrotic vertebra, vertebral metastases and tumours, and congenital anomalies.

### *The Treatment of Athlete's Foot*

THE zinc and copper salts of undecylenic acid are becoming increasingly popular in the treatment of athlete's foot. The incorporation of these salts in a suitable base presents some difficulties, and A. Axon (*Pharmaceutical Journal* June 7, 1947, 158, 396) recommends the following formula:—

Bentonite .....	2
Lanette wax SX .....	5
Liquid paraffin .....	25
Hard paraffin .....	3
Zinc or copper undecylenate .....	5
Water .....	to 100

Melt the hard paraffin in the liquid paraffin and add the undecylenate; when dissolved add the lanette wax SX. Prepare a gel of the bentonite (which acts as a stabilizing agent) in hot water and mix the two liquids. Shake or homogenize until cool. Satisfactory creams are said to have been prepared with 10 per cent. of the undecylenate and 40 per cent. of liquid paraffin.

### *The Abuse of Nose Drops*

THE harmful effects produced by the prolonged use of nasal drops containing ephedrine or ephedrine-like substances are well demonstrated in experiments reported by R. E. Ryan (*Proceedings of the Staff Meetings of the Mayo Clinic*, March 19, 1947, 22, 113). Two series of animals were used. One series received di-

desoxyephedrine with sodium sulphathiazole and sodium sulphadiazine, the other a popular American preparation known as naphazoline hydrochloride. With both types of drops the cilia of the nasal mucous membrane were destroyed and recovery did not take place during the course of the experiments (four to five weeks). The epithelium became oedematous and changed to stratified epithelium. Fibrosis developed in the subepithelial layer and constriction and sclerosis of the blood vessels were observed. Throughout the experiments a mucocellular exudate was noted. The clinical picture in the noses of the rabbits was similar to that seen in patients who use nose drops excessively. The conclusion is drawn that "if nose drops are to be used for the relief of certain symptoms referable to the nose, it would seem important that they be employed only in association with competent medical advice, rather than promiscuously".

### *Nicotinic Acid and Pruritus*

NICOTINIC acid has been found to be useful in the treatment of pruritus by M. Sibirani (*Minerva Medica*, 1947, 38, 89). The substance (0.2 gm.) was injected intravenously or intramuscularly daily. The patients so treated were suffering from a variety of diseases ranging from eczema to psoriasis, acrodermatitis, senile pruritus, lichen, and erythrodermatitis from arsenic. The injections were continued for varying periods according to the individual case, but the beneficial effects on pruritus were often observed after the first four to five days. The mechanism of action is unknown, but the author is inclined to believe that it is due to an anti-histamine action of nicotinic acid.

### *Vitamins E and C in Neuromuscular Conditions*

A SERIES of forty-one cases, comprising patients with diabetes complicated by persistent pain in the arms and legs, non-diabetic individuals with similar pains, patients with diabetes and osteoarthritis, and non-diabetics with arthritis and Heberden's nodes, as well as a small group of miscellaneous conditions of unknown origin with physical signs of arteriosclerotic disease, allergies and fat dystrophy, were treated by long-continued administration of vitamins E and C, and the results are recorded by J. R. Williams (*New York State Journal of Medicine*, May 15, 1947, 47, 1125). Each patient was given at breakfast time a polyvalent preparation containing the minimal daily requirements of vitamins A, B, C and D; at noon each received 25 mgm. of vitamin E and 50 mgm. of vitamin C and at the evening meal 40 mgm. of the natural

mixed tocopherols. Treatment was continued for one month to a year or more and clinical observations made at monthly intervals. In the first group, which comprised 20 cases of diabetes with neuromuscular pains, complete relief of long-standing pain was obtained in 5, and definite but not complete relief in 4. The second group comprised 6 cases, in 2 of which results were negligible and in 4 relief from pain was definite; in the third group, 2 of the 4 patients claimed diminution of pain, and in group 4 in 2 of the 5 cases treated the symptoms definitely subsided. It is stated that although the series is small the fact that a significant proportion obtained relief from pain suggests that deficiency of vitamin E may be "one of the unaccountable factors in muscular pain".

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*Treatment of Impotence.* By JOSEPH LOEWENSTEIN, M.D. London: Hamish Hamilton Medical Books, 1947. Pp. 9. Price 6s.

Dr. E. B. Strauss points out in his foreword, "Often happens that a valuable form of treatment is forgotten when its chief exponent disappears from the scene of action. This is true of treatment of impotence by the use of a form of mechanical support. The author of this little book has therefore performed useful service in bringing to our notice a form of treatment that is now become unfashionable in this country. It describes an easily adjustable penile splint which may allow a patient suffering from impaired erections to achieve successful intercourse. There comes a time in the psychological treatment of impotence when a successful issue will restore self-confidence and when failure will undo all the benefits so far obtained, and it is in such a case that Dr. Loewenstein's form of splint should prove of great value. His instructions on the subject of the application of the splint and the indications for its use are simple and clear, and the necessary illustrations have been provided."

*Diseases of the Heart and Kidney.* By J. C. BANERJEA, M.B., M.R.C.P., and P. K. CHATTERJEE, M.B., M.R.C.P. Calcutta: U. N. Dhur & Sons, Ltd., 1947. Pp. 184. Figures 42. Price Rs. 8.

This is the first volume of a projected "Handbook of Clinical Medicine". On the whole, the teaching is sound, although a curious omission from the list of signs of congestive heart failure is the absence of any reference to hæmoptysis, and there is a tendency to over-emphasize purgation as a means of getting rid of œdema fluid. The book is commendably brief and practical, and a serious attempt has obviously been made to bring it as up to date as possible. The rather misleading reference to the use of penicillin in the treatment of subacute bacterial endocarditis is presumably due to the book having gone to press before the more recent and convincing evidence concerning the value of penicillin in this condition was available.

#### NEW EDITIONS

In the preparation of the fourth edition of *A Textbook on the Nursing and Diseases of Sick Children*, by Various Authors, edited by Alan Moncrieff, M.D., F.R.C.P. (H. K. Lewis & Co., Ltd., 30s.) a considerable amount of new material has been added. The advent of the sulphonamides and penicillin has necessitated

their inclusion in many sections; advances in orthopædics have been included in the chapter devoted to this subject, and there is an excellent chapter dealing with psychological disorders in childhood. The work, which covers all the different aspects of nursing procedures and treatment of children, has been extensively rewritten, and practitioners will welcome the new edition, which is well produced and generously illustrated.

The sixth edition of *Surgical Pathology*, by William Boyd, M.D., F.R.C.P., M.R.C.P.ED. (W. B. Saunders Company, 50s.) contains a new chapter dealing with the pathology and pathological physiology of congenital heart disease, and sections on tumours of the larynx, avitaminosis in carcinoma of the mouth, the diagnosis of carcinoma of the cervix by the Papanicolaou vaginal smear method, and fibrositis of the muscles of the back. These are but a few of the new additions which have been incorporated in accordance with the surgical advances during the war years. The new edition is richly illustrated, containing in all 530 figures.

The inclusion of a new chapter on special feeding methods which covers the administration of nutrients by the parenteral and enteral routes, and a new section on the treatment of starvation are outstanding features of the second edition of *A Textbook of Dietetics*, by L. S. P. Davidson, M.D., F.R.C.P., F.R.S.E., and Ian A. Anderson, M.B.E., B.Sc., M.B., Ch.B. (Hamish Hamilton Medical Books, 21s.). This manual of dietetics, which was primarily written for students and general practitioners, deals not only with nutrition in its general sense but also with the special dietary for specific diseases. There is a generous supply of food tables and recipes; a whole chapter is devoted to diabetes mellitus, and there is a useful section on protein hydrolysates.

In the author's own words the second edition of *Penicillin Therapy*, by John A. Kolmer, M.S., M.D., D.P.H., Sc.D., LL.D., L.H.D., F.A.C.P. (D. Appleton-Century Co., New York, \$6) "has been heavily revised, largely rewritten, and considerably enlarged". Whilst the greater part of the book is devoted to penicillin, there are valuable sections dealing with streptomycin, tyrothricin and streptothricin. A new feature in this edition is a chapter on the use of antibiotics in veterinary medicine. In spite of the rapidly changing face of antibiotic therapy, this new edition is well up to date and can be thoroughly recommended, particularly to clinicians, as the standard American work on the subject.

In other words, this is a medical biography, and as such, written with all that meticulous care that Cushing inculcated in his assistants, it provides a valuable addition to the medical history of the last seventy years. The only error that has been detected is on p. 558, where a distinguished chemist is mistakenly installed in a chair of pharmacology. An interesting feature of this work to Oslerians is that the author has made the same mistake as his subject made in his life of Osler, by persistently refusing to identify himself by name. This characteristic self-effacement (the name of Fulton is only mentioned once in the whole text—in one of Cushing's letters to Klebs) rather detracts from the value of the book, and at least one reader wished that he could have had more of Fulton on Cushing, but perhaps that may come one day. Meanwhile the world of medicine will be grateful for this portrait of the pioneer of neurosurgery.

*New Aspects of John and William Hunter.*

By JANE M. OPPENHEIMER. London: Wm. Heinemann (Medical Books) Ltd., 1946. Pp. xviii and 188. Illustrations 5. Price 25s.

THIS handsomely produced, if expensive, work will be welcomed by all who are interested in the famous brothers. In an attempt to throw fresh light on the personality of the more famous of the two, it discusses anew the two entirely separate problems—(a) why his brother-in-law, Sir Everard Home, destroyed John's manuscripts, and (b) the character of William. A penetrating analysis of Home's character and of the bearing this has upon the destruction of the famous manuscripts leads to the conclusion that there is more to be said for this "infamous act" than is generally thought. The second part of the book attempts to portray the personality of William by discussing his relationships with the leading members of the Court and of the Government in his day. Whilst there is little that will be new to devoted Hunterians, the book, written in an easy style, throws fresh light on one of the most fascinating problems in the medical history of this country. Once again historians over here are indebted to an American for a careful compilation of historic data.

*The Diagnosis of the Acute Abdomen in Rhyme.* By ZETA. London: H. K. Lewis & Co. Ltd., 1947. Pp. vii and 88. Illustrations 24, by Peter Collingwood. Price 5s. 6d.

The acute abdominal emergencies form a group that test the practitioner's clinical sense,

his powers of observation and decision, more than any other. By the way he handles them his reputation may be made or marred. To quote Zeta:—

"When the abdominal muscles are on guard  
You cannot gauge their stiffness by the yard;  
When gas distension makes the belly tense,  
There's no gasometer for flatulence,  
And no great learned scientific brain  
Has yet evolved a test to measure pain."

Clinical wisdom is gained only by slow experience.

The pseudonym of Zeta masks, without concealing, the identity of a well-known writer on the diagnosis of the acute abdomen. That he committed his wisdom to rhyme was a happy inspiration, for every student knows that a jingle will stick where polished sentences will fade, and on the whole the worse the rhyme the more it sticks. But this book is remarkable not merely for the vehicle in which it is expressed, the completeness with which it covers the subject, and the soundness of the teaching it embodies; it contains a wealth of case histories, including illnesses of the writer and his family, nearly all relating to mistakes and the lessons that should be drawn from them. Not the least attractive part of the book are the drawings by Peter Collingwood, reminiscent of those in Belloc's "Bad Child's Book of Beasts".

*Leitfaden für Zuckerkrankhe.* By DR. MED.

GEORG R. CONSTAM. Basle: Banno Schwabe & Co., 1947. Pp. 127. Figures 15. Price Sw. frs. 12.50.

IN instructing the diabetic in his way of living, a balance must be struck between too great a dependence of the patient on the physician and, on the other hand, too great, at times even dangerous, independence. The author of this manual emphasizes throughout the necessity of medical supervision, while explaining the rationale of his treatment to the patient. The method of calculating carbohydrate, fat and protein contents of the diet is explained in detail, but the actual composition of the individual's diet is wisely left to the judgment of his physician. It can be inferred that the author favours a fairly high carbohydrate diet and that he would not personally insist on meticulous accuracy in most instances. A three-dose system of insulin treatment would appear to be commonly employed in Switzerland, and relatively little space is devoted to the slow-acting insulins. Difficulties of communication in a mountainous country are reflected in the instructions for the treatment of impending coma prior to the arrival of the doctor. Useful tables of food values are appended and it is consoling to find that in at least one European country fat may still be freely employed in cooking.

## THE PROBLEM OF BRIGHT'S DISEASE

By ROBERT PLATT, M.D., F.R.C.P.

*Professor of Medicine, Manchester University.*

THE discovery of the ultimate cause of nephritis has for a long while proved elusive to medical science. New concepts of disease have been adopted one by one, such as bacterial infection, endocrine disorder, nutritional deficiency and virus infection, but each in turn has failed to enlighten us on the subject of Bright's disease. Nevertheless, we are a great deal nearer to an understanding of this problem than we were a few years ago, and even if full knowledge of the processes involved still awaits the result of further experiment, at least we know, or think we know, the direction from which the final explanation will come, and the shape which the experiments are likely to take.

### ETIOLOGY

It is clear to all who have studied the disease that acute nephritis is closely related to streptococcal infections, of which tonsillitis and scarlet fever are the most common. But it is equally clear that the disease is not due to the direct invasion of the kidney by bacteria, nor to the direct effect of their toxins, for nephritis does not develop at the height of the infection, but during convalescence; the pathological process, moreover, is non-suppurative, micro-organisms are not found in the kidney or the urine, and the severity of the nephritis is not determined by the gravity of the initial illness. These peculiarities might be explained if nephritis were the result of an abnormality connected with the development of immunity—some process analogous to allergy or to anaphylaxis. There is a good deal of evidence that this is the case.

Indirect support for this concept of nephritis has been obtained from the work of Masugi (1933, 1933-34, 1935), who prepared what is called a nephrotoxic serum by the injection of a suspension of rabbit kidney into ducks. When the duck serum was then injected into rabbits, an acute nephritis resulted, resembling in all essentials the human disease. These observations have been amply confirmed by other authors (Arnott, Kellar and Matthew, 1936; Smadel, 1937) and by suitably modifying the dosage, chronic nephritis with hypertension and uræmia has been produced. The recent work of Cavelti and Cavelti (1945) has carried the problem a stage further. These authors claim to have produced nephritis in rabbits and in rats by injection of homologous (i.e. rabbit or rat) kidney suspension plus a suspension of

# NOTES AND PREPARATIONS

## NOTES AND PREPARATIONS NEW PREPARATIONS

**"DEXEDRINE" TABLETS**—Dexedrine (dextro-amphetamine), a compound closely related to benzedrine, has been prepared for use as a stimulant of the central nervous system in depressive states, and in the treatment of obesity by control of appetite. It is stated to exert a profound and sustained stimulant effect upon cerebral activity, and to possess a wide margin of safety and freedom from untoward reactions. Dexedrine tablets are issued for prescription in packs of 24 tablets of 5 mgm. by Menley & James Ltd., 119-123 Coldharbour Lane, London, S.E.5.

**DIODONE B.D.H.** is a sterilized aqueous solution containing 35 per cent. w/v of the diethanolamine salt of 3:5-diiodo-4-pyridone-N-acetic acid for use as an X-ray contrast medium. Its use is indicated principally in intravenous pyelography, but it may also be employed for retrograde pyelography, and radiography of veins, arteries and joints. The manufacturers are the British Drug Houses Ltd., Graham Street, City Road, London, N.1, by whom Diodone is issued in ampoules of 3 c.cm. and 20 c.cm. of 35 per cent. w/v solution, in boxes of 1 and 6 ampoules.

**FOLVITE (Lederle)** is a pure synthetic preparation of folic acid (*L. casei* factor) and has been prepared for use in the treatment of the macrocytic anæmias and sprue. It is issued in tablets of 5 mgm. in tubes of 25, for oral administration, and in ampoules of 1 c.cm. (15 mgm. per c.cm.) for parenteral administration. "Folvite and liver extract" is for parenteral use in resistant cases, and "Folvron" (folic acid and ferrous iron) capsules and tablets for cases in which hypochromia is present. The manufacturers are Lederle Laboratories Division of the American Cyanamid Co. of New York, and the products are marketed in this country by Cyanamid Products Ltd., Brettenham House, London, W.C.2, from whom further particulars and literature can be obtained.

### A SULPHONAMIDE CHART

**SHARP AND DOHME LTD.** have recently issued an up-to-date version of their chart "The Characteristics of Certain Sulphonamides", a copy of which will be sent free of charge on application to the Medical Information Department, Sharp & Dohme Ltd., Hoddesdon, Herts.

### THE PROBLEM OF THE UNSTABLE ADOLESCENT GIRL

The Report of the Joint Committee of the British Medical Association and the Magistrates' Association on the problem of the unstable

adolescent girl, entitled "The Problem Girl deals with the different types of girl between the ages of thirteen and seventeen who come before the Courts, the procedures adopted under the Children and Young Persons Act, new methods of control recommended, and after-care. The Report is published by the British Medical Association, Tavistock Square, London, W.C. price 3d.

### A MEDICAL FILM

"TAKE THOU" gives the story of the manufacture of drugs from the early days when physicians prepared their own remedies, through the period of the apothecary and the individual pharmacist to the present-day custom of bulk manufacture. The many processes of modern pharmaceutical manufacture as carried out in the laboratories and factories of Evans Medical Supplies Ltd. are well shown. The film, which has a length of 2,388 feet and takes 25 minutes to show, is made by Basic Films. It is available free on loan in 35 mm. and 16 mm. monochrome sound versions, on application to the Public Relations Department, Evans Medical Supplies Ltd., Speke, Liverpool 19.

### LEISHMAN, ALEXANDER AND PARK MEMORIAL PRIZE FUND

The R.A.M.C. Prize Funds Committee has decided to put up for award in 1948, the Leishman Memorial Prize (medal and £30), open to officers of the Royal Army Medical and Dental Corps for the best work in any branch of medicine, surgery or allied sciences or in connexion with the general duties of the R.A.M.C. R.A.D. Corps; the Alexander Memorial Prize (medal and £70), open to R.A.M.C. officers for professional work of outstanding merit; the Parkes Memorial Prize (medal and £60), open to regular serving medical officers on full duty of the Royal Navy, Army or Indian Army for professional work of outstanding merit. Recommendations should be sent, with copies of original articles or reports of investigation, through the usual channels to the Hon. Secretary, R.A.M.C. Prize Funds Committee, R.A.M. College, Millbank, London, S.W.1, December 31, 1947.

### INTERNATIONAL SHORT WAVE CONGRESS

An International Short Wave Congress will be held in Amsterdam on July 19-24, 1948. Those wishing to take part or to attend should apply to the Principal Secretary, Dr. J. Sauer, Weteringschans 73, Amsterdam.

The contents for the September issue, which will contain a symposium on "Renal Disease", will be found on page lxiv at the end of the advertisement section.

arteriolar changes causes further ischæmia and thus further hypertension. The second concept is what may be called the malignant termination of Bright's disease. All renal diseases, if they produce ischæmia, give rise to hypertension which in time causes further renal damage. Thus all renal diseases may end in a similar terminal stage of hypertension and uræmia, and without a clear knowledge of their earlier history it may be impossible clinically, and even histologically, to distinguish between them. Nephritis, malignant hypertension, pregnancy toxæmia and chronic pyelonephritis (to quote only a few examples) may all end in this way. It is this terminal common stage of kidney disease which used to be referred to as chronic interstitial nephritis. A more extensive summary on the relation between renal disease and hypertension appeared recently in *The Practitioner* (Wilson, 1947).

Although not strictly coming within the scope of Bright's disease, the subject of renal hypertension cannot be left without referring to the fact that there is increasing recognition of the importance of chronic pyelonephritis (urinary infection) as a cause of hypertension. In some of these cases the infection has become inactive, so that neither pus, bacteria nor albumin may be found in the urine, and the case is difficult to distinguish from essential hypertension except by its previous history and the absence, usually, of any evidence of an hereditary factor (Platt, 1947) such as would be expected in essential hypertension.

The importance of realizing the different causes of hypertension is increased by the knowledge that in man, as in the rat, hypertension may occasionally be due to disease of one kidney only, and that in such cases nephrectomy has been known to lead to permanent cure of the hypertension. More than 100 cases of nephrectomy for hypertension have now been published, and have recently been reviewed (Langley and Platt, 1947). All younger patients (say under forty-five) with hypertension, and all those with a history suggesting a urological lesion, should therefore be thoroughly investigated.

#### CLASSIFICATION

The further study and understanding of the course of Bright's disease have given rise to a more simple and rational classification. There is still a tendency to speak of three *stages* of nephritis, the acute, the subacute with œdema, and the chronic. Anyone who has followed large numbers of cases over a period of years, however, will realize that such a classification shows a profound ignorance of the onset, course and prognosis of Bright's disease.

There is a type which starts acutely with headache, vomiting, hæmaturia, transient œdema and hypertension. It occurs in children and young adults and usually follows a streptococcal infection. A few patients die in the acute stage, the great majority (over 80 per cent.) recover completely and permanently, and the remainder run a latent course often lasting many years. During this long latent stage they do not suffer from recurrent



streptococci. If this work is confirmed it would suggest that in human disease the streptococcal infection in some way causes the renal tissue to become antigenic, and when immunity develops, an acute antigen-antibody reaction occurs in the kidney. The reason for the localization of the disease in the kidneys may simply be that these organs contain, and their integrity is dependent upon, the most vulnerable part of the vascular system, namely, the glomerular capillaries.

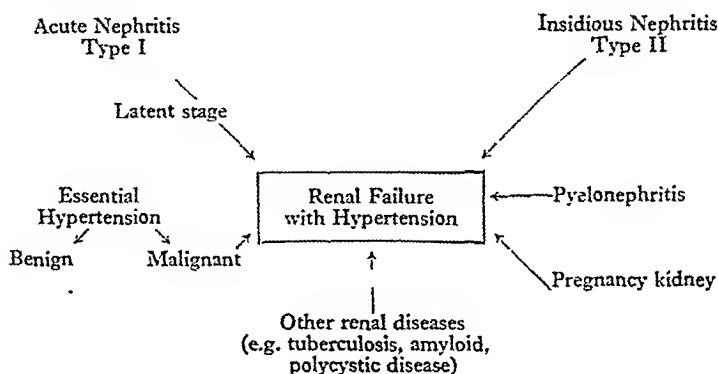
#### A HYPOTHESIS OF THE CAUSE OF PREGNANCY KIDNEY

The foregoing work on experimental nephritis has led me to speculate upon the possible cause of pregnancy kidney, a condition which resembles nephritis in so many ways, and yet is so clearly related to pregnancy. If there is an antigenic incompatibility between the mother and the child similar to that which can occur with the Rh blood groups, and the foetus produces an antibody to its mother's kidney which the mother absorbs back through the placental exchange, this would account for most of the facts: for instance, the onset of the disease only in the later months of pregnancy, the tendency to cure on expulsion of the foetus, the tendency to recur in subsequent pregnancies, and the fact that the kidneys of the foetus are never adversely affected. This immunity from damage of the foetal kidney seems inexplicable on any toxæmic theory. This (unpublished) hypothesis has not yet been subjected to experimental investigation, but the same idea has occurred to others, and Penrose (1946) and Kalmus (1946) have shown the type of genetic distribution of the disease which might occur if the hypothesis were true: for instance, an increased incidence of pregnancy toxæmia would be expected in the sisters and the husband's brothers' wives of those affected by the disease. It is to be hoped that confirmation will soon be forthcoming.

#### THE RELATION OF BRIGHT'S DISEASE TO HYPERTENSION

If the ultimate cause of Bright's disease is still obscure, its relation to hypertension has become greatly clarified. The work of Goldblatt *et al.* (1934) showing that renal ischaemia induces hypertension is now classical, and too well-known to require further description here, but the more recent work of Wilson and Byrom (1939, 1941) is especially important because of its practical bearing on the problem of Bright's disease. These authors showed that in rats, persistent and severe hypertension could be caused by constriction of the renal artery of one kidney only, and that when the constriction was sufficiently severe, all the arteriolar changes of malignant hypertension could be produced in the opposite kidney as well as in other organs. Histological changes in the kidney, previously thought to be due to inflammation, could be produced by hypertension alone. This work has made clear two very important concepts. The first is what Wilson and Byrom (1941) call the vicious circle in Bright's disease—the fact that renal ischaemia caused by the disease produces hypertension, which by producing

form, and those cases of so-called acute focal nephritis in which hæmaturia during the height of an infective illness is the only symptom have not been discussed. My main purpose, however, is to condense, simplify and emphasize, and not to write a textbook. This conception of two major types of nephritis, and of the common termination of almost any progressive destructive disease of the kidney, simplifies diagnosis, prognosis, and, above all, *thought* on the subject of kidney disease: it may be represented as follows:—



#### DIAGNOSIS AND PROGNOSIS

From what has preceded, it will be seen that confronted with a case of hypertension, albuminuria and retinopathy, it is no longer sufficient to speak of chronic interstitial nephritis. This may be the terminal stage of Type I or Type II nephritis, of malignant (essential) hypertension, of pyelonephritis, pregnancy kidney, and occasionally of other renal diseases.

In prognosis, the outlook in acute nephritis is good, even though the patient may be seriously ill and his condition give rise to considerable anxiety for several weeks, but the chances of recovery for the man or woman who complains of nothing more than a swelling of the legs are small indeed.

#### TESTS OF RENAL FUNCTION

The work of Homer Smith and his colleagues has provided methods of testing differentially the function of the glomeruli and the tubules of the kidney. They have shown that inulin and mannitol are substances which are removed from the blood by the glomerular filter and, unlike urea, are not reabsorbed in the tubules. Inulin and mannitol clearance values (i.e., the volume of plasma cleared of inulin per minute) therefore give an index of the amount of glomerular filtration. Diodrast and para-amino-hippuric acid, however, are substances which are removed from the blood by tubular excretion. Their clearance therefore gives a measure of the total renal blood flow. The relation of one figure to the other; inulin clearance/diodrast clearance, gives what is called the filtration fraction, or the proportion of the

attacks of œdema or exacerbations of nephritis, but remain apparently well although examination reveals persistent albuminuria, a moderately raised blood pressure and a gradual deterioration of renal function. After an interval, sometimes of two or three years and sometimes much longer, the patient complains either of symptoms referable to hypertension (visual disturbances, periodic headache or cardiac symptoms) or to uræmia (anorexia, weakness, vomiting, muscular twitching, tetany, drowsiness and coma). In all probability this terminal stage is reached when the hypertension becomes severe enough to cause further acute damage to the renal arterioles (the vicious circle), but uræmia may occasionally occur with normal or only moderately raised blood pressure. This description of the several courses of acute nephritis applies to more than 95 per cent. of cases, but it must be admitted that occasional cases are known which run a sub-acute or stormy course with œdema persisting or returning, and death within a few months of the onset.

The great majority of cases of nephritis with *gross persistent œdema*, however, are different from the start. They occur at any age. They start *insidiously without illness, usually by the patient discovering œdema of the ankles and the doctor finding heavy albuminuria*. There is usually no obvious connexion with an infective illness. In some of these patients hypertension is present from the onset: these run a rapidly downhill course and are usually dead within two years. Some, however, have a normal blood pressure, and these tend to run a more favourable course with varying degrees of albuminuria and œdema for many years. These latter were at one time thought to be a different group (nephrosis) but the majority develop renal failure and hypertension sooner or later, and the conception of nephrosis as a separate disease running a distinct course cannot be upheld. The total recovery rate for the whole group is probably less than 5 per cent. In a series of 34 cases of this insidious type of nephritis which I was following from 1934 to 1939, only 1 appeared to have recovered completely; 1 recovered but recurred; 17 were already dead; the remaining 15 all had persistent gross albuminuria, many of them still with œdema, and some of them developing renal failure.

Ellis (1942), in his Croonian lectures on the natural history of bright's disease, which should be read by everyone interested in the subject, makes out a strong case for the clinical and histological distinction between these two main types of nephritis, which he calls simply type I and type II.

Type I, with an abrupt onset, related to infection, occurring in young people, with over 80 per cent. recovery rate, the remainder usually running a latent course to terminate in hypertension and uræmia.

Type II, occurring at any age (nine months to sixty-seven years in my series), unrelated to infection, starting insidiously, and marked clinically by a prolonged stage of persistent œdema.

Many would consider this classification an over-simplification. There are a few, but in my experience a very few, cases which do not run true to

(after many weeks in bed if there is still notable albuminuria and some hypertension) we do not compel him to lead his limited life span as a nervous invalid in a state of acute anxiety. We tell him that the albumin is "left" by the nephritis, that his kidneys are functioning well, and that there is no evidence that the disease is active. Let him return to work, eat a normal diet, smoke, drink, and prosper while he may. If we tell the relatives too much they will pass their anxiety on to the patient sooner or later. It is better to tell them the same tale even though someday it may have to be admitted that "the disease has become active again".

In *Type II nephritis*, no curative treatment is known. Therapy consists mostly of an attack on the œdema. Usually this consists of a high protein, low salt diet, which may have to be supplemented by mechanical removal of fluid, by intravenous plasma (which is not usually very effective), and by mercurial diuretics in selected cases.

Schemm (1942, 1944) has suggested that by giving a *high fluid*, low salt régime in cases of cardiac and renal œdema, excretion of sodium is encouraged, with consequent loss of water. I have recently tried the effect of a fluid intake of 4 to 4½ litres per day (about 7 pints) with salt restriction. The effect in each case has been an initial gain in weight for the first few days followed by a remarkable diuresis and weight reduction. In most cases the œdema has disappeared completely. On the basis of this early experience I would not recommend a trial of this treatment in cases in which œdema was extreme and dangerous, since the initial retention of fluid might give rise to fatal complications such as laryngeal or pulmonary œdema.

Finally, in *chronic nephritis* and uræmia—terminal renal failure—we are much more prone nowadays to admit defeat, and we are not interested in any remedy except the palliative and the psychological.

### References

- Arnott, W. M., Kellar, R. J., and Matthew, G. D. (1936): *Edinb. med. J.*, 43, 233.  
 Cavelti, P. A., and Cavelti, E. S. (1945): *Arch. Path.*, 40, 148, 158, 163.  
 Ellis, A. (1942): *Lancet*, i, 34, 72.  
 Goldblatt, H., Lynch, J., Hanzal, R. F., and Summerville, W. W. (1934): *J. exp. Med.*, 59, 347.  
 Kalmus, H. (1946): *Ann. Eugen.*, 13, 146.  
 Langley, G. J., and Platt, R. (1947): *Quart. J. Med.*, 16, 143.  
 Masugi, M. (1933): *Beitr. path. Anat.*, 91, 82.  
 — (1933-34): *Ibid*, 92, 429.  
 — (1935): *Klin. Wschr.*, 14, 373.  
 Penrose, L. S. (1946): *Ann. Eugen.*, 13, 141.  
 Platt, R. (1947): *Quart. J. Med.*, 16, 111.  
 Schemm, F. R. (1942): *Ann. int. Med.*, 17, 952.  
 — (1944): *Ibid*, 21, 937.  
 Smadel, J. E. (1937): *J. exp. Med.*, 65, 541.  
 Wilson, C., and Byrom, F. B. (1939): *Lancet*, i, 136.  
 —, — (1941): *Quart. J. Med.*, 10, 65.  
 — (1947): *The Practitioner*, 158, 453.

total plasma flow which is diverted through the glomerular filter. Although these advances are adding considerably to the knowledge of renal physiology and of renal function in disease, the methods are not yet adapted to the practical routine testing of renal function. Most physicians in this country rely on the blood urea, and some test of renal concentration power, such as a simple water concentration test. If the patient is deprived of fluid intake for 16 hours, i.e., from 4 p.m. until 8 a.m., the urinary specific gravity should rise to 1.025 or more. In elderly persons 1.020 is satisfactory. In advanced renal failure no concentration beyond 1.010 is possible.

The urea clearance test is used largely to-day in hospital practice and gives a figure by which the functional capacity of the kidney can be roughly estimated quantitatively. In America, the excretion of phenol-sulphone-phthalein is still commonly used as a test of renal function.

These tests are usually of most value in the later stages of disease, and in distinguishing benign hypertension with albuminuria due to cardiac failure from malignant hypertension or chronic (Type I) nephritis with renal failure. In the former, the renal concentration power is preserved.

#### TREATMENT

The treatment of kidney disease has been left to the end. This is symbolic of the fact that advances in knowledge are still far ahead of advances in therapy. The physician's outlook on treatment in kidney disease has, however, been influenced by the therapeutic advances in other branches of medicine. The appreciation of therapeutic agents such as iron, liver, vitamins, penicillin, sulphonamides, hormones, quinine, mepacrine and digitalis, used scientifically and in their right places, has completely dwarfed the importance of the minor remedies, or attempts at therapy which were so much discussed in former years, and which amounted mostly to auto- and hetero-suggestion. Now that there are so many disorders which we can treat, we are no longer ashamed to admit that there are some which still evade our efforts, and we do not waste time in the writing of useless prescriptions.

The other change of outlook has come through the greater acknowledgment of the importance of psychotherapy, even in organic disease. It has always been practised, but the credit has often gone to the bottle of medicine in which the psychotherapy was dispensed. Bearing these two principles in mind, the therapy of nephritis may be summarized quite simply.

In the acute stage of *Type I nephritis*, spontaneous cure will take place in the majority of cases. It behoves us to give the patient the best chance. So far as we know, restriction of fluid, food and salt and confinement to bed are the best measures. Drugs are useless. Complications, such as convulsions, heart failure, may need special treatment.

Having decided that the patient is cured (no œdema, normal blood pressure, trace of, or no albumin), we say so and let him eat what he likes. Having, on the other hand, decided that he has entered the latent stage

typhoid groups may be found. A proteus infection is not uncommonly associated with stone. Careful microscopic examination of the urine sediment should be carried out to establish the presence of pus. In the male it is essential that a clean second-glass specimen of urine is obtained, and in the female a specimen obtained by catheter is the only satisfactory means of ascertaining the exact nature of the disease. Examination of a twenty-four hour specimen may be necessary if tuberculous infection is suspected.

#### THERAPEUTIC METHODS

Despite the new antiseptic drugs which have been developed in the past decade, *alkalis*, especially sodium citrate, may play an important part in the management of *Bacillus coli* infections of the urinary tract, particularly in the acute phase.

The *alkali treatment*, in addition to inhibiting the growth of many of the common types of organisms, has a beneficial effect in other ways, and especially because it produces a large volume of dilute urine. Such treatment is often usefully combined with the sulphonamide drugs. Failure to obtain good results with alkalis is usually due to inadequate dosage or the use of a complex nauseating mixture. A simple method is to prescribe sodium citrate alone in solid form and instruct the patient to take 1 teaspoonful in water every two hours until the urine is alkaline, and thereafter four-hourly.

The *ketogenic diet* and its difficult and unpleasant application was soon superseded by *mandelic acid* and its derivatives ammonium mandelate and calcium mandelate. For successful mandelic acid therapy, not only is a concentration of 0.5 per cent. in the urine necessary but the pH of the urine must be 5.5 or lower. This means restriction of fluids and the additional use of ammonium chloride. In addition to these drawbacks most mandelic acid preparations are extremely unpleasant to take, but treatment may be useful in some more chronic infections with gram-negative bacilli or *Streptococcus faecalis*. Under such conditions, about 8 gm. of mandelic acid a day is the required dose. The treatment is unsuitable for the acute phase because of the necessary fluid restriction to two pints daily.

*The sulphonamides.*—*Sulphacetamide* (albucid) appears to be the most satisfactory of the sulphonamide drugs. In the more acute phase it may be given with sodium citrate. In the chronic case it may be a valuable agent in the control of urinary infections. Toxic effects are minimal. The usual dose is 1 gm. four-hourly for five days. The indiscriminate use of the sulphonamides in urinary tract infections is unsatisfactory.

*The antibiotics.*—In staphylococcal infection *penicillin* may be of great value. Otherwise it plays little part in the control of urinary infections. The value of *streptomycin* in the control of urinary tract infections has not yet been fully evaluated but clearly this antibiotic has not been the panacea that was anticipated. Even so it may come to play an important part in the control

# INFECTIONS OF THE KIDNEYS

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THE management of patients with urinary tract infections tends in most instances to remain empirical, although it is now well known that the successful use of the many effective drugs depends largely upon the predisposing or complicating features. There are two main reasons for this attitude. First, simple remedies often alleviate symptoms without eliminating the infection, and second, the diagnosis may be vague and without any true appreciation of the etiology.

## DIFFERENTIAL DIAGNOSIS

The term pyelitis is used loosely when it may cover such varied syndromes as acute febrile attacks with rigors or an anxiety state frequency. In the very young, fever may be the presenting feature; in the old, bladder symptoms due to cystocele or prostate obstruction may predominate. Less frequently profuse bacteriuria may confuse the picture. When infection occurs in a normal urinary tract the illness is acute and yields readily to treatment. In the more resistant case it is necessary to consider the nature of the many defects, both anatomical and pathological, which are found to coexist in the urinary tract in association with infection, and the type of micro-organism concerned. Urine stasis is the dominant feature predisposing to infection. This has long been recognized in regard to the bladder, but obviously stasis may operate in the ureter, kidney pelvis and calyx. Such anatomical defects as cystocele, prostate obstruction, diverticulosis of the bladder, hydro-ureter, double ureter, bifid pelvis, hypoplasia and hydro-nephrosis must be considered. Calculus, papilloma, tuberculosis and carcinoma are examples of pathological conditions which may silently predispose to infection in the urinary tract. Pyelitis is commonly associated with pregnancy, dilatation of the ureters and kidney pelves, with consequent urine stasis occurring at about the fifth month. Anæmia, particularly iron deficiency anæmia, is a predisposing factor. Diarrhœa, whatever its cause, is much more often associated with pyelitis than is constipation.

Failure to recognize these allied conditions accounts for most therapeutic failures. Indeed it is doubtful whether infection ever persists in a normal urinary tract; but its eradication from an abnormal urinary tract may be difficult or impossible. If therefore pus and organisms persist in the urine, a complete investigation, including pyelography and cystoscopy, is essential as a prelude to any rational therapy. The discovery of abnormal anatomy or an underlying pathological condition may then demand its own particular surgical treatment. *Bacillus coli* is by far the most common infecting micro-organism. Streptococci, staphylococci and the bacilli of the proteus and

# RENAL CALCULI

By ARTHUR JACOBS, F.R.F.P.S.

Surgeon, Urological Department, Glasgow Royal Infirmary.

ALTHOUGH the exact etiology of kidney stone is not known, many theories have been advanced to explain the causes responsible for this condition. A knowledge of these theories is of importance, for on them are based the methods of treatment that have been evolved for the prevention of recurrent calculus formation. A consideration of the following etiological factors will show that several are probably required to initiate the formation of a stone. It will also be apparent that calculosis can no longer be regarded as an entity, but rather as a focal manifestation of certain abnormal processes.

## ETIOLOGICAL FACTORS

*Colloid—crystalloid imbalance.*—The urine is a supersaturated solution of crystalloids principally composed of uric acid, urates, calcium oxalate, phosphates, calcium carbonate and cystine. These are held in solution by the presence of colloids, namely mucin, glycogen, chondroitin-sulphuric acid and nucleic acid. Anything which disturbs the balance between the crystalloids and colloids, for example, an error in metabolism, or infection, will result in a precipitation of the urinary salts and will set in motion the formation of a stone. It is, nevertheless, a common clinical experience to see patients with an excessive amount of crystalloids in the urine, for example, phosphates, who do not develop stone.

*Stasis and infection.*—Stasis is not by itself a cause of stone formation. If it were, one would expect to encounter fewer cases of hydronephrosis of long standing uncomplicated by the presence of a calculus. When, however, infection with consequent colloidal disturbance or some other stone-forming process is at work, stagnation will increase the possibilities of the crystalloids being retained and of deposition of the salts on the nucleus. Examples of stone formation associated with stasis are frequently encountered in sanatoria and in patients who have been immobilized in bed for long periods because of injuries. With the patient constantly kept on his back, drainage from the renal pelvis and calyces is impaired. Concurrently, there is frequently an associated infection and an upset of calcium metabolism due to disuse atrophy of bone.

With regard to the rôle which infection plays, Robinson (1947) has recently summarized the present-day views in the following lines:—

“(1) Infection upsets the colloid crystalloid balance; (2) it produces epithelial clumps which form nuclei for crystallization; (3) it may produce papillitis; (4) living bacteria have been found in and cultured from the centre of calculi; (5) urea-splitting organisms produce calcium phosphate precipitation, as urea has definite solvent properties for this salt”.



of chronic proteus and coli infections and in tuberculosis of the urinary tract. A practical difficulty in its prophylactic or pre-operative use may be the rapidity with which organisms become "fast" to this substance.

In rare instances *ureteric catheterization* may be a valuable aid. This is particularly so when in acute pyelitis a block occurs at the pelvi-ureteral junction with persistence of symptoms, especially severe loin pain, high fever and rigors. The introduction of the catheter by the expert is without risk and is followed by immediate relief. In pyelitis of pregnancy this manœuvre dispenses with the need for a termination of pregnancy. The catheter is usually left *in situ* for two to three days, after which relapse is unusual.

That therapy may alleviate symptoms without eliminating the infection has already been emphasized. A realization of this fact is most important in pyelitis of pregnancy. Failure to treat such infection adequately after confinement may result in chronic subinvolution of the dilated urinary tract with subsequent chronic sepsis and even stone formation.

Finally, it must be noted that *arterial hypertension* and its complications may be the late sequel of chronic infection of the kidney. When such occurs the unilateral diseased kidney is usually without function and is therefore better removed. The hypertension may be alleviated by such procedure in some young patients. In others, the consideration of sympathectomy operations will be demanded in addition.

#### CONCLUSION

In all but the most transient infections of the kidney, urine stasis is the dominant factor. A complete investigation of the urinary tract is necessary to determine the anatomical or pathological basis of such a state. The relative merit of the drugs discussed is quite unimportant without full appreciation of this fact. The possible sequelæ of a chronic infection of the kidney, such as stone and hypertension, must not be ignored, and such may demand special surgical treatment.

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A startling example of the stone-forming capacity of urea-splitting bacteria which I observed, occurred in a young man on whom a left nephrectomy had already been carried out for stone. He developed a proteus infection and within two months the pelvis and calyces of his solitary right kidney, which prior to the onset of the infection was known to be free of stone and to have a normal pyelographic appearance, became filled with a large collection of calcium phosphate calculi. Stone not associated with a urinary infection is, of course, a frequent occurrence, and urinary infections which do not produce stone are a commonplace.

*Randall's hypothesis.*—Randall (1936), following a series of researches, postulated that a renal calculus would require an initiating lesion on the renal papillæ, and on routine examination of autopsy material he found visible deposits of calcium on the papillary walls. These calcium plaques, at first subepithelial, lost their epithelial covering, following which, macroscopic calculi became superimposed upon the calcium deposits and lay as a denuded foreign body exposed to urine. A constant encroachment of the urinary salts proceeded until the stone was dislodged, carrying the plaque away with it. Randall's discovery explains for the first time how an initiating stone lesion originates. The papillary pathology that precedes the development of the stone was not found to be infective, the depositions occurring in a devitalized avascular area. A further form of papillary pathology associated with an intratubular inspissation of salts, is brought about by degenerative changes in the walls of the tubules from impaired blood supply or toxins. This type is associated with hyperparathyroidism, hypervitaminosis, and certain forms of renal infection.

*Metabolic and endocrine disorders.*—Many observers have proved experimentally that a deficiency of vitamin A in the diet can be a fundamental factor in stone formation. The deficiency causes a keratinizing effect on the epithelium of the urinary tract and upsets the calcium phosphorus balance. The availability of milk, cod-liver oil and fresh vegetables has decreased the incidence of stone that can be attributed to this cause.

Hyperparathyroidism causes an increase in both calcium and phosphorus in the urine, the former being mobilized from the osseous system. The colloid-crystalloid balance of the urine is upset with precipitation and coalescence of the urinary constituents. It was considered by Barney and Mintz (1934) that parathyroid disease was the causal factor in 10 per cent. of cases of urinary lithiasis. A reduction in the blood calcium and phosphorus, and hence a reduction in the excretion of these constituents in the urine, will follow the removal of a parathyroid tumour.

#### DIAGNOSIS

The most constant symptoms of renal calculus are pain and colic associated with visible or microscopic hæmaturia and often accompanied by pyuria. Excruciating pain or colic results from the stone lodging at the outlet of the pelvis and the consequent tension which ensues from this. The maximum

pain is usually located at the costo-vertebral angle of the affected side and may be referred along the course of the ureter or over the iliac crest. Prostration and vomiting frequently accompany the attack, which may last from a few minutes to several hours and sometimes for days. The pain stops when the tension is relieved by the stone becoming disengaged from its point of impact. A small stone blocking the outlet of a calyx is more likely to give rise to a dull loin pain rather than colic. A calculus occupying a non-obstructing position may attain large dimensions and cause irreparable damage to the kidney without the patient suffering any appreciable discomfort. This type of stone, unaccompanied by severe symptoms, is frequently encountered in the female patient, the onset seemingly following a pregnancy many years earlier. It would seem that the dilatation of the ureters and renal pelves, which normally takes place during pregnancy, had failed to resolve on one side and that the consequent stasis and infection predisposed to silent stone formation.

One of the grossest examples of silent stone formation I have encountered was in a middle-aged, very stout lady, whose doctor found at a routine test made whilst attending her for influenza that the urine was thick with pus. Investigation and subsequent nephrectomy revealed an enormous pyonephrotic kidney containing multiple large phosphatic calculi (fig. 11).

Hæmaturia usually accompanies an attack of renal colic. The blood is generally mixed with the urine, giving it a smoky appearance. It is rarely of sufficient account to cause clotting and frequently is of microscopic degree. Pyuria is more common when the stone is of the large type and when renal damage has resulted. The pyuria may be symptomless or give rise to a cystitis due to the descending urinary infection.

*Differentiation.*—Although the history and symptoms of a patient with stone are often suggestive, an exact diagnosis is only possible after X-ray examination. Almost any other renal surgical lesion can cause symptoms similar to those resulting from stone, and renal colic or pain may simulate certain extrarenal conditions. Of these latter, pain arising from the gall-bladder, the appendix and the intestinal tract has most frequently to be differentiated. It is a common enough experience to see patients with a renal or ureteric calculus, on whom appendicectomy has been carried out, with, of course, no relief from the abdominal pain that had been complained of. Conversely, it is necessary to be on guard against diagnosing an attack of colic as being due to stone in the kidney when its origin is elsewhere.

I recall being asked to see a middle-aged man, who, a short time previously, had been under my care because of a small stone in his right kidney. He had been treated expectantly and passed the stone. He suddenly developed acute pain in the right lower quadrant of the abdomen and it was thought that another small stone was present and descending the ureter. The tenderness and rigidity present in the iliac fossa along with high temperature and fast pulse left little doubt that an inflamed appendix was the responsible factor. This was confirmed by a colleague within a few hours, when he removed a suppurating appendix.

*Pyelography.*—In every suspected case of stone, a straight X-ray of the complete urinary tract, that is, kidneys, ureters and bladder, should be

made. This will show if a stone is present, except in those rare instances when it is formed entirely of urates, uric acid, triple phosphates or cystine. These substances in their pure state give poor shadows. The more commonly occurring calcium oxalate and calcium phosphate calculi give good shadows and it is rare for one or other of these constituents not to be coincidentally present with the less common substances (Winsbury-White, 1924). Joly (1929a) considered that 98 per cent. of stones could be demonstrated by a plain X-ray. Whether or not a calculus shadow is detected, an intravenous pyelographic examination should be made. If no stone is present, this may reveal some other renal lesion to be responsible for the symptoms, or show

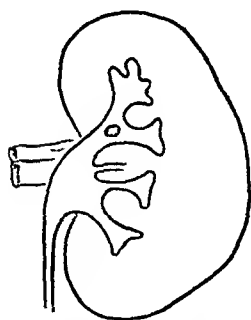


FIG. 1.—Stone in pelvis small enough to pass spontaneously.

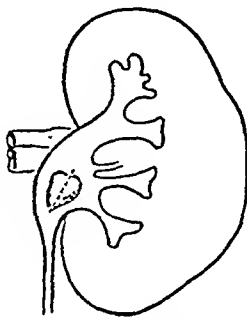


FIG. 2.—Pyelolithotomy for stone in renal pelvis.

that the latter are not of renal origin at all. When one or more stones are present, the pyelogram will show their position in the kidney and the degree of hydronephrosis, if any, that has resulted. It will also indicate the function of the other kidney as well as the existence of any renal anomaly.

Cystoscopy, catheterization of the ureter and retrograde pyelography are not required as routine procedures with stone. If, however, the renal function of the affected side has been seriously impaired, that kidney will not excrete the radio-opaque solution and pyelography by the retrograde method may be required to confirm the diagnosis and to reveal the state of the kidney. Retrograde pyelography is generally the more satisfactory method of differentiating doubtful shadows in the vicinity of the kidney and ureter, and in this connexion great help is often obtained by films taken in the lateral position. When infection is present it is of importance to obtain a specimen of urine from each kidney, in order to ascertain if the infection is confined to the side harbouring the stone.

#### TREATMENT

When the diagnosis of renal calculus is established, operation is usually indicated, except in those instances when the calibre of the stone is small enough to permit of its spontaneous passage out of the renal pelvis and its descent down the ureter (fig. 1). Such patients should be treated conservatively. A daily fluid intake of five to six pints should be advised, and if infection is present every effort should be made to eliminate it, either by means of one of the recognized urinary antiseptics or with the sulphonamide appropriate to the infecting organism. Repeat X-ray examinations should be made to check the movement of the stone, its passage

through the lower ureter being aided, if necessary, by cystoscopic dilatation of the tube. In the event of the stone failing to leave the kidney, operation may be required, particularly when the patient is being subject to recurring attacks of colic or when pyelographic examinations show that hydronephrotic changes are occurring. Relief from colic, more instantaneous and effective

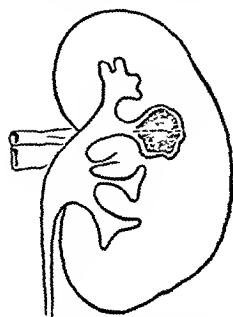


FIG. 3.—Nephrolithotomy for stone within a calyx.

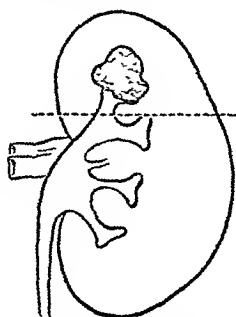


FIG. 4.—Resection of upper pole of kidney for stone lying in a dilated upper calyx.

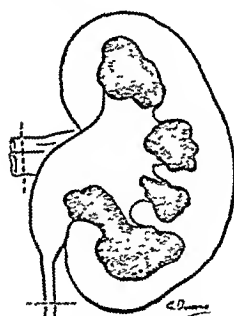


FIG. 5.—Nephrectomy for multiple large calculi which have caused irreparable damage to the kidney.

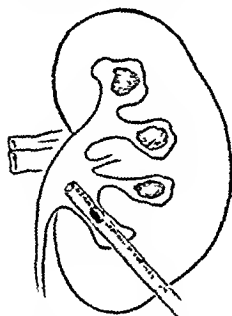


FIG. 6.—Nephrostomy tube in position, through which Suby's solution can be instilled for the dissolution of residual calculus fragments.

than that which results from morphine or pethe-dine injections, can be obtained by inserting a catheter up the ureter into the kidney pelvis and thereby immediately releasing the tension.

The alternative operative procedures that can be carried out for renal calculus are removal of the stone, resection of the calculus-bearing segment of the kidney with its content, and removal of the kidney (fig. 2 to 5). Extraction of the stone through an incision in the renal pelvis is the most desirable method of operative intervention, as no damage is caused thereby to the kidney parenchyma. The majority of stones can be dealt with in this way, the incision generally being made in the posterior wall and the stone removed with the aid of suitable forceps inserted

through the opening, which is then closed with a few interrupted catgut sutures. An approach through the renal parenchyma, that is, a nephrolithotomy, is required in such circumstances as when the stone lies in a calyx inaccessible through the pelvis, when the pelvis itself is inaccessible because of its intrarenal position, and for the removal of multiple large stones. There is no bloodless area in the parenchyma and the site and direction of the incision through the kidney substance is best determined by the position of the stone. When calycal stones have caused localized dilatation, the empty cavity remaining after their removal is, as a result of stasis and infection, a fruitful source of recurrent calculus formation. A partial nephrec-

tomy with inclusion of the abnormal calyx will prevent this. The procedure is most applicable to stones in the upper and lower group of calyces when the upper or lower pole of the kidney can be resected. Nephrectomy is required if the kidney is extensively and irreparably damaged. Such is usually the case with very large stones, with multiple stones scattered throughout the kidney, or with a stone, often quite small in size, which has for a long time occupied an obstructing position (fig. 8).

The treatment of *bilateral renal calculi* presents a serious problem, particularly when the stones are of the large phosphatic type and the kidneys are dilated and infected (fig. 12 and 13). Early recurrence readily takes place and for this reason some surgeons hesitate to advise operation. With intensive post-operative therapy, however, improved results can be expected, and if it is considered that the renal damage is not irreversible, operation should be undertaken. The better kidney should first be dealt with and, after the stone or stones have been removed, temporary nephrostomy drainage should be established. The nephrostomy tube can be used subsequently to instil antiseptic solutions into the kidney. In addition, if, as is sometimes unavoidable when dealing with this type of calculus, stone fragments or debris are left behind, the nephrostomy tube provides an excellent route for the introduction of Suby's\* solution for their dissolution (fig. 6 and 14). Having made sure of good function in one kidney, the other is operated on as soon as the patient has recovered adequately.

Stone in a solitary kidney is another serious problem and irreparable damage may occur if it is not removed. The operation must be as conservative as possible and temporary nephrostomy drainage will, as a rule, be a safeguard.

During the year 1946, operations for renal calculi were performed on 42 patients in the urological department of the Glasgow Royal Infirmary. A nephrectomy was deemed necessary in 17 patients. In 15 a pyelolithotomy was carried out and a nephrolithotomy in 8. In 2 cases a partial nephrectomy was performed. In 2 cases both kidneys were involved and treatment was by nephrolithotomy and temporary nephrostomy.

#### PREVENTION OF RECURRENT CALCULUS FORMATION

The incidence of recurrent stone formation in the kidney after conservative operations has been estimated to be about 16 per cent. in aseptic or slightly infected cases and as high as 50 per cent. in patients with severe infections (Joly, 1929b). It is therefore a matter of importance to try and circumvent all the conditions that are known to predispose to stone formation. The methods to be adopted are essentially the maintenance of a large urinary output, control of stasis and infection, and dietary measures which will

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\*The formula for Suby's solution G., which is superior to other solutions devised to bring about a dissolution of stone, is: citric acid, monohydrated 32.25 gm., magnesium oxide, anhydrous 3.84 gm., sodium carbonate 4.37 gm., water q.s. to 1000 c.c.m. It only affects stones composed of calcium phosphate or carbonate or magnesium ammonium phosphate.



FIG 7—Small stone impacted at the outlet of the renal pelvis and removed by pyelolithotomy.



FIG 8—Grossly infected hydronephrotic kidney due to a small stone impacted at the uretero-pelvic junction. The kidney was irreparably damaged and a nephrectomy required.



9—Calculus in left kidney forming cast of pelvis and calyces. Two additional small fragments occupy the lower pole.



FIG 10—Large multiple calculi within a pyonephrotic kidney. The patient had a symptomatic pyuria.





FIG. 11.—Massive calculosis of right kidney. Intravenous pyelogram shows some dilatation in the left kidney pelvis



FIG. 12 —Bilateral renal calculus



FIG 13 —Bilateral renal calculus of the branching type. It is this type that has a tendency to early recurrence after operation



FIG 14 —A calculus fragment lying alongside a nephrostomy tube in the right kidney. Its complete dissolution with Suby's solution was effected within eleven days

regulate the urinary pH and thereby prevent the precipitation of salts. In order to maintain as dilute a urine as possible, a daily fluid intake of 5 to 6 pints should be advised. Prevention of post-operative stasis should be taken care of at the time of operation. Thus, a ptosed, mobile kidney should be fixed well up in the renal space and a constriction at the uretero-pelvic junction eliminated by a plastic procedure. If a urinary infection persists after operation, every effort must be made to overcome it. If cocci and *B. proteus* are not eliminated, further stone formation is probable. Intelligent treatment of the infection necessitates a knowledge of the nature of the infecting organism, so that the appropriate agent can be used against it. Hexamine and mandelic acid, combined if necessary with an acidifying drug such as ammonium chloride, the sulphonamides and penicillin all have a place in the therapy of urinary infections. It is also of importance to ascertain the presence of, and to eradicate, any focal infection such as may be found in the teeth, the gall-bladder or the intestinal tract.

As lack of vitamin A has been shown to result in damage to the renal epithelium, an ample intake should be ensured with halibut-liver oil capsules or cod-liver oil.

*Dietary measures* have as their aim the maintenance of a highly acid urine when the primary stone removed was of the type most easily precipitated in an alkaline urine, for example, one consisting of calcium phosphate. Conversely, when the stone was one most easily precipitated in an acid urine, for example, a uric acid or oxalate calculus, a highly alkaline urine is the objective. The acid ash diet, as it is known, allows of an unrestricted consumption of bread, pastry, unsalted meat, fish and eggs. Milk, fruits and vegetables of high alkaline ash content and salt are limited. The diet is regulated so as to maintain the urinary pH at 5 to 5.2, ammonium chloride being employed, if necessary, to enhance the acidification. The alkaline ash diet consists of a high intake of milk, butter, fruits and vegetables of high iron content, and reduced consumption of meat, soups and eggs. This, if necessary, is supplemented by alkalis. Higgins (1936) has claimed that by meticulously controlling the pH of the urine by these dietary measures he has reduced his incidence of post-operative recurrences of stone from 16.4 to 4.7 per cent.

Just as no one single factor explains the origin of a renal calculus, so no one prophylactic procedure can prevent a recurrence. The use of the above measures in combination should, however, materially help to reduce the incidence of new stones appearing in a kidney.

### References

- Barney, J. D., and Mintz, E. R. (1934): *Trans. Amer. Ass. Genito-Urin. Surg.*, 27, 203.  
Higgins, C. C. (1936): *J. Urol.*, 36, 168.  
Joly, J. S. (1929): "Stone and Calculus Disease of the Urinary Organs," London, pp. 163 (a), 260 (b).  
Randall, A. (1936): *New Engl. J. Med.*, 214, 234.  
Robinson, R. H. O. B. (1947): *Proc. roy. Soc. Med.*, 40, 201.  
Winsbury-White, H. P. (1924): *Brit. J. Surg.*, 12, 5.



FIG. 11.—Massive calculosis of right kidney. Intravenous pyelogram shows some dilatation in the left kidney pelvis.



FIG. 12.—Bilateral renal calculus.



FIG. 13.—Bilateral renal calculus of the branching type. It is this type that has a tendency to early recurrence after operation.



FIG. 14.—A calculus fragment lying alongside a nephrostomy tube in the right kidney. Its complete dissolution with Suby's solution was effected within eleven days.

The early lesion is usually found at either pole of the kidney, but authorities differ in placing the origin in the cortex or the medulla. Occasionally the whole kidney is converted into a caseous mass with partial calcification, little involvement of the ureter and none of the bladder. Calculi may form in the dilated and infected pelvis of the kidney. More usually the bladder is infected round the ureteric orifice, and as the infection persists there is dilatation of the lumen and thickening of the wall of the ureter. The bladder infection spreads on the surface from the orifice, and deeply into the wall, with more or less fibrosis and ulceration, and marked diminution of bladder capacity. This scarring of the bladder wall may lead to ureteric stricture and secondary hydronephrosis, even of the sound kidney.

In the urinary tract, tuberculosis spreads *via* the lumen, and in the wall of the duct in the direction of the stream. There is little evidence to support lymphatic spread against the flow of urine except in the presence of a stricture.

Tuberculosis of the kidney occurs most frequently between the ages of twenty and forty, these two decades accounting for 72 per cent. of cases, and it is rare in the first decade. There is no material difference in its incidence in the two sexes.

#### THE CLINICAL PICTURE

When there is ulceration of the tuberculous lesion into the pelvis of the kidney, there will be some disturbance of micturition. Irritative bladder symptoms will occur with frequency of micturition as the most constant feature, and when the bladder is full the patient will suffer pain above the pubis and a sense of urgency; there may also be pain during and after passing urine. These are the symptoms of cystitis from any cause; the urine will show pus cells and in about two-thirds of the cases no organisms on routine culture. This is immediately a suspicious feature and calls for a search for tubercle bacilli and other investigations for tuberculosis. When *B.coli* and streptococci are found in the urine with pus cells the case will usually be treated with alkalis or a sulphonamide, as for a simple urinary infection. If the symptoms or urinary changes persist or recur after one such course of treatment, full investigation for stone, hydronephrosis or tuberculosis must be made.

Painless frequency of micturition without bladder involvement at cystoscopy occurs in some cases. Similarly, painless hæmaturia is always suggestive of this particular infection. Frank hæmaturia may precede or accompany these symptoms of cystitis in about half the cases. An ache or pain in the back sometimes occurs, and occasionally there is an attack of renal colic from ureteric obstruction by debris or blood clot.

Often in the early stages there is little constitutional upset, but loss of weight, a low fever with lassitude and fatigue out of proportion to the apparent mildness of the urinary infection would point to the more serious

# RENAL TUBERCULOSIS

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RENAL tuberculosis requiring treatment is not a very common disease. Bell (1946) found it in only 0.4 per cent. of 32,360 autopsies, and it was the major cause of death in only 0.2 per cent. of this series. Nevertheless, the disease claims close attention because it may be the cause of any persistent or recurrent urinary symptoms, and it must be detected early for the very practical reason that more than half the cases can be permanently cured by radical surgery. The relation of tuberculosis of the kidney to tuberculosis of other organs is also of considerable importance, bearing in mind the fact that tubercle bacilli are frequently blood-borne, and the kidney may excrete tubercle bacilli without itself suffering more than a microscopic lesion, which does not require treatment.

Tuberculosis of the kidney is a metastatic manifestation of infection elsewhere in the body and the source of the infection may be clinically active or latent; if it is active the patient obviously needs a sanatorium type of treatment. It is equally important to recognize that a latent infection is never definitely healed and is, in fact, potentially a source of further local or generalized lesions. Just how much this is likely is important in deciding on the correct time for operation in relation to bed rest and sanatorium treatment.

These aspects of early diagnosis and of assessment of the case for treatment are given particular attention in this article, which necessarily includes also a brief review of etiology, symptomatology and prognosis.

## PATHOLOGY AND ETIOLOGY

At post-mortem examination the most common type of renal tuberculosis seen is the miliary form, part of a more or less generalized miliary tuberculosis. With this type we are not further concerned here except in its relation to tuberculous bacilluria. The usual lesion is an ulcerative one involving the papillæ or the pelvic wall and spreading down the ureter to the bladder. In a few cases small localized masses, not penetrating into the pelvis of the kidney, are seen. At autopsies on deaths from pulmonary tuberculosis, quoted by Bell (1946), Jameson found the miliary form in 20.9 per cent., and the nodular form in 7.1 per cent., whilst Greenberger found 45.6 per cent. miliary and 4.8 per cent. nodular. Bell, in a study of 35 early cases of renal tuberculosis, found 6 examples of a nodule 1 to 3 cm. in diameter and restricted to the cortex; in 5 cases there was a wedge-shaped lesion from the middle of the cortex through the pyramid into the pelvis, and 24 cases showed lesions restricted to the medulla and adjacent pelvic mucosa.

As a general rule, if a patient constantly shows tubercle bacilli and pus cells in the urine, the renal lesion is an open one requiring treatment. In bacilluria with microscopic tubercles in the kidney, the urinary changes are less constant, but nevertheless a few pus cells are nearly always found in that specimen which contains the bacilli. Therefore the presence or absence of pus cells is not a guide in the differentiation of surgical tuberculosis from tuberculous bacilluria. It can be concluded that a perfectly normal kidney does not excrete tubercle bacilli, that whenever such bacilluria occurs the kidneys will show evidence of tuberculous infection, either macroscopic or microscopic, and that the microscopic lesions seldom progress to frank disease requiring treatment. Tuberculosis of the genital tract alone may give tubercle bacilli in the urine, but it is often accompanied by renal infection.

Once renal tuberculosis is suspected, full urological investigation is required. Repeated search for tubercle bacilli in the urine, including animal inoculation, pyelography and cystoscopy, should not be omitted. These three investigations are generally practised. I would add that no such investigation is complete without an X-ray of the chest because, as stated before, active or latent pulmonary tuberculosis is found in one-third of all cases of renal tuberculosis. It need hardly be stressed that the patient must be fully examined for genital tract lesions, including a rectal examination, and for evidence of tuberculosis elsewhere. The day has gone when it was stated that pulmonary tuberculosis was rarely associated with surgical tuberculosis, i.e., of bone and joint and urogenital system, as though there were one form of tuberculosis for the physician, and one for the surgeon.

*Urinary tests.*—Examination for bacilli is made either on an early morning specimen or on a 24-hour specimen. The deposit is centrifuged, and direct smears are examined; due care must be taken to exclude smegma bacilli. Culture gives quicker results, but guinea-pig inoculation is more reliable. Finding pyuria without the common organisms on culture will intensify the search for tuberculosis, but a few such cases will prove to be examples of amicrobic pyuria (Jacobs, 1945). This may be a virus infection, and is accompanied by irritative bladder symptoms and sometimes hæmaturia. The bladder shows widespread inflammatory changes with gradual reduction of capacity. It is said to respond to two or four weekly injections of novarsenobenzol.

*X-ray examination.*—While the urinary tests are proceeding a plain X-ray of the whole urinary tract is made, followed by excretion urography. This may show calcification or a destructive lesion of one or more calyces with or without hydronephrosis and ureteric dilatation. The density of the dye shadows will give some indication of kidney function.

*Cystoscopy* is essential to assess the extent of bladder involvement, and in most cases it will be advisable to collect a ureteric catheter specimen from the normal side for routine tests, and inoculation into a guinea-pig. A

condition. In fact, the onset of renal tuberculosis is as a rule rather insidious. Marked pyrexia is a feature of advanced disease when secondary infection is present.

The presence of tuberculosis in any other part of the body, especially genital in the male, either active or apparently arrested, in a patient with urinary symptoms would strengthen the suspicion of renal tuberculosis. The urologist may expect to find active or latent pulmonary tuberculosis in one-third of his cases of renal tuberculosis. There is general agreement that about 50 per cent. of male patients with genital tuberculosis have renal lesions, both in studies of autopsies and clinically, when all cases of genital tuberculosis are subjected to complete urological study (Band, 1942).

Nesbitt *et al.* (1946) can be quoted to show the relative frequency of the common symptoms. In 260 cases in which the duration of symptoms before admission varied from one month to fourteen years, with an average of two years, 80 per cent. of the cases presented pus in the urine and irritative bladder symptoms. Pain or an ache, and also gross hæmaturia, occurred in 50 per cent. Organisms in the urine other than tubercle bacilli were found in 30 per cent. of cases when first investigated and diagnosed.

The encapsuled or nodular tuberculous lesion found at either pole of the kidney may be entirely symptomless or it may give very slight transient symptoms which are sometimes recurrent, or, after a long period of latency, it may ulcerate through into the pelvis and produce the more constant symptoms of an open lesion with secondary involvement of ureter and bladder. Thus this type of lesion may be an accidental finding at autopsy, or on X-ray examination. When transient symptoms occur, followed by recovery without operation, it must be assumed that the lesion opens into the pelvis for short periods and then heals, although it may break down again, even years later. It must be stressed that this is exceptional; as a rule ulceration is followed by progressive disease unless cured by nephrectomy.

#### INVESTIGATION AND DIAGNOSIS

Before discussing the investigation and diagnosis of renal tuberculosis, the position with regard to the significance of tuberculous bacilluria must be clarified. The conclusions to be drawn from the work of Band (1942) and others may be summarized in this way :—

If large numbers of patients with extra-urogenital tuberculosis are examined (those undergoing treatment for pulmonary, bone and joint or glandular lesions, who have no frank symptoms of urinary disturbance), about 15 to 20 per cent. will show tubercle bacilli and a few pus cells in the urine. This bacilluria is more common in the more seriously ill patients, and as a terminal event, but in those who progress satisfactorily the bacilluria tends to be intermittent or transient. Of all such cases under 5 per cent. develop frank renal tuberculosis, when followed up for several years.

In these cases of bacilluria, cystoscopy and pyelography gave negative results, but in those which came to autopsy, although no naked-eye evidence of tuberculosis was seen, almost invariably bilateral microscopic lesions were found, provided that serial sections were examined.

lesion which gives no recognizable sign of activity, and yet is a potential source of active disease locally or remotely, is a most important one in the management of all tuberculous patients.

When one kidney is quite destroyed by tuberculosis, the infection appears to be inactive, and there are no urinary symptoms, the question of operation arises. For the same reasons I believe such a kidney should be removed: it is a potential source of trouble. This decision will, of course, be governed by other factors, such as the age of the patient; as an accidental finding in an elderly patient it might well be left alone.

When *bilateral disease* is present, the extent of the infection in the good kidney, and its function, must be carefully assessed, and the patient must be observed for sufficiently long to determine that there is a good resistance to the disease, before deciding on a nephrectomy on the side of more advanced disease. If a further pyelogram after some months of sanatorium régime shows the lesion in the better kidney to be stationary, the other kidney is removed. If the lesion is obviously progressing, no operation is advised. The prognosis, however, in manifest bilateral renal tuberculosis is poor, with or without operation.

Equally difficult is the decision to operate on a kidney in the presence of active tuberculous disease in the lungs or elsewhere. This may be necessary in rare cases with unbearable pain from advanced renal tuberculosis which does not allow the patient to obtain sufficient rest. In such a case the operation is seldom more than palliative, and may not be successful even in giving relief of pain.

Uncontrolled hæmorrhage or urinary sepsis may likewise demand operation when the patient would not have been considered very suitable for operation otherwise.

In general, when there is active pulmonary tuberculosis in conjunction with ulcerative renal disease, operation is deferred until the lung disease is controlled by strict bed rest and, if necessary, some form of collapse therapy, but in some cases the active urinary infection appears to retard healing of the lung disease, and operation has to be performed in the presence of active pulmonary tuberculosis. Here close cooperation between physician and surgeon is essential.

The treatment of *inoperable bilateral renal tuberculosis*, like that of pulmonary tuberculosis which is so extensive that it is beyond help of any form of collapse therapy, is symptomatic, and the management of the case is a compromise between strict rest and a more lenient régime. The amount of rest prescribed will be decided by the immediate benefit to the patient's symptoms rather than by the vain hope of allowing the disease to heal. Occasional courses of sulphonamides or of drugs to keep the urine alternatively alkaline and acid, may help to control secondary infection. Keeping the fluid intake down in the evening may give more sleep by diminishing the frequency of micturition at night. Opium should not be withheld in the



knowledge that the "normal" kidney is not constantly excreting pus and tubercle bacilli, and also gives a normal retrograde pyelogram, is highly desirable. If the ureter on the diseased side is not obstructed by inflammation or stricture, a confirmatory pyelogram may have to be done on this side too. The risk of spreading infection by ureteric catheterization is not now regarded as a contraindication to this procedure, and valuable information may be so obtained (Wells, 1943). After assessing the extent of the tuberculosis in the genito-urinary tract, and searching for evidence of the disease elsewhere, it is important to be sure that the good kidney is functioning normally. Excretion urography will give a good indication of this, but a blood urea and a urea concentration test must also be made. A thorough physical examination must be done, paying special attention to the blood pressure, the state of the arteries and the retinal vessels.

*Tuberculosis of the bladder* is always secondary to renal disease, and if tubercle bacilli are found with evidence of bladder involvement, and pyelograms fail to reveal the renal disease, the patient must be carefully watched. If the bladder changes round one ureter and tuberculous bacilluria persist for some months, it will be necessary to operate on the kidney of that side, even in the presence of a normal pyelogram. If the symptoms and cystoscopic signs and the bacilluria clear up entirely, the case may be left alone, but the follow-up must be continued for two to three years at least. This is unusual; most cases with bladder involvement progress to established ulcerative disease needing active treatment.

#### TREATMENT

In the vast majority of cases of clinical disease of the kidney, healing never takes place without radical surgery; in this it differs from most other forms of tuberculosis. This is the reason that the disease is almost entirely in the hands of the surgeons. The physician's duty is to pick up the early case for the surgeon to investigate, and to help him to decide on the right time for operation, particularly when there are lesions elsewhere. Surgeons are not as a rule accustomed to assessing the activity of pulmonary tuberculosis, and no renal lesion is so actively progressive, provided the patient is kept at rest, that a delay of two or three months before operation will affect the outcome.

In *unilateral renal disease* without any evidence of tuberculosis in the rest of the body, the indications for nephrectomy are clear, and the results are good. Every such operation should be followed by six or more months of sanatorium rest treatment, depending partly upon the extent of the disease left in the ureter and bladder; but even if this is minimal and heals very rapidly, the period of rest should not be reduced below six months because there may be a small undetected lesion in the remaining kidney. This period of rest will also help to ensure arrest of the focus of infection which originally produced the metastasis in the kidney. This conception of an unstable

# THE SIGNIFICANCE OF HÆMATURIA

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HÆMATURIA means the presence of red blood cells in the urine. It is a symptom and not a disease, is common, and arises from many different affections of the urinary tract. It must be distinguished from hæmoglobinuria, which means the presence of blood pigments, especially methæmoglobin, in the urine, and the distinction can only be made by microscopy, for ordinary chemical tests give the same reactions in these two closely related symptoms.

For the detection of slight hæmaturia the ordinary chemical tests for blood are not satisfactory and are positive only when the urine is smoky to the naked eye. Extra-urinary contamination must be excluded and in the female this may be difficult unless a catheter is used. Further sources of error arise from the fact that the passage of an instrument may cause slight hæmorrhage from the urethra. Therefore if extra-urinary contamination can be excluded, the presence of red blood cells is of more significance if the specimen has been passed naturally than if it has been collected by a catheter.

Before considering hæmaturia more fully, it is well to remember that hæmoglobinuria is an important symptom and is recognized by spectroscopic examination of the urine from which red blood cells are known to be absent. The presence of blood pigments alone may be due to chemical poisoning by potassium chlorate, sulphanilamide and other drugs, or to infective diseases such as syphilis and malaria, to mismatched blood transfusion, and to paroxysmal hæmoglobinuria, an obscure disorder in which hæmoglobinuria follows exposure to cold or violent exercise.

In some diseases, such as a growth in the bladder, bleeding is the characteristic symptom, in others it is exceptional, but it is safe to say that practically every disease of the urinary tract can at one time or another cause hæmorrhage, and some of the more serious diseases are unobtrusive in their symptoms. In cases of hæmaturia the general practitioner bears a grave responsibility and he must address himself to the following questions:—First, the anatomical source of the blood; second, the nature of the pathological lesion.

## DIAGNOSTIC FEATURES

Blood in the urine is fortunately a symptom which frightens the patient, and all but the most careless seek medical advice without delay. Although it may be due to systemic or other extra-urinary cause, hæmaturia practically always means a lesion of some kind in the urogenital tract. Although the general practitioner may have near at hand all the diagnostic paraphernalia

terminal stages. The place of streptomycin in treatment has still to be worked out. Preliminary reports merely suggest that it leads to some improvement in a percentage of cases.

### PROGNOSIS

The natural course of the disease has already been indicated above. Frank renal tuberculosis is a slowly progressive infection, rarely cured except by radical surgery, which runs a course of months or years of distressing symptoms. In some few cases the process is so chronic that although tubercle bacilli and pus cells are constantly present in the urine, the patient leads a restricted but relatively useful life for many years. Death occurs from uræmia, sepsis or generalized tuberculosis.

Wildbolz (quoted by Roche, 1938) followed up for ten years 316 cases not submitted to operation: nearly 70 per cent. died within this period, and over 84 per cent. of these deaths occurred in the first five-year period. Two-thirds of the survivors had severe urinary symptoms. A similar follow-up of 500 nephrectomy cases showed a mortality of 20 per cent. Roche stated that the average results of nephrectomy for renal tuberculosis were: operation mortality 5 per cent., late mortality 15-20 per cent., permanent cure in 50 per cent., and that the remaining 25 per cent. usually lived for many years, although they harboured foci of active tuberculosis. The fact that most of the deaths from tuberculosis of the remaining kidney occurred within two years, suggested that the kidney was already affected at the time of nephrectomy.

The prognosis of the bladder symptoms, in particular frequency, is dependent first upon eradication of the kidney disease, and secondly upon the degree of involvement of the bladder wall. If it has already progressed to fibrosis, frequency will remain even after nephrectomy.

### References

- Band, D. (1942): *Edinb. med. J.*, 49, 273.  
 Bell, E. T. (1946): "Renal Diseases", London.  
 Jacobs, A. (1945): *Glasg. med. J.*, 144, 161.  
 Nesbitt, R. M., Kertzer, W. A., and Lynn, J. M. (1946): *J. Mich. med. Soc.*, 45, 494.  
 Roche, A. (1938): *Brit. Encycl. med. Pract.*, 7, 404.  
 Wells, C. (1943): *Post-Grad. med. J.*, 19, 270.

infection, especially tuberculosis, or stone in the kidney or bladder. A stone travelling down the ureter causes bleeding which is overshadowed by the clamorous renal colic. Tuberculosis steadily and slowly affects the bladder function causing frequency and dysuria, and before the disease is far advanced there is pus in the urine and other evidence of the disease in the kidneys, prostate or testicles. A smoky trace of blood in the urine generally indicates a renal origin, such as chronic nephritis, hypertension or a silent calculus.

Apart from the naked-eye examination of the specimen passed a more detailed examination is of great assistance. Excess of albumin or casts, or both, with the blood indicates nephritis, acute or chronic. Excess of leucocytes or frank pus means an infection which may exist alone or be associated with a stone or new growth. Culture of the urine determines the organism except in tuberculosis, in which case the urine is sterile by ordinary methods, but the bacillus can sometimes be identified on examining the deposit from all the urine passed in twenty-four hours, or, more certainly, by culture on special media or guinea-pig test.

(c) *The presence or absence of associated symptoms*:—(i) *Fever* associated with hæmaturia may be due to general disease, including septicæmia, endocarditis or other infective condition. It may also occur in poisoning, including that by sulphanilamide, which may cause not only hæmaturia but complete blockage of the kidney with deposited crystals of the drug and urinary suppression. General diseases being excluded, fever and hæmaturia indicate an inflammatory lesion in the urinary tract. Acute and subacute nephritis have diagnostic features of their own, but pyelitis, pyonephrosis and perinephric abscess give signs localized to the affected kidney. Cystitis and prostatitis disturb the bladder, causing frequency or stranguary.

(ii) *Pain and frequency* are on the whole suggestive of lesions of the lower urinary tract, of which cystitis, stone, tuberculosis, enlarged prostate and new growth are the most common. If difficulty in micturition is added then there is almost certainly an obstruction in the bladder outflow due to enlargement of the prostate, stone or urethral stricture. The well-known picture of the elderly man with intermittent hæmaturia, difficulty of micturition, frequency and two large herniæ, is characteristic of prostatic obstruction.

(iii) *Pain in the loin* or radiating down the urethra, if dull and heavy in character, means chronic infection or a stationary stone, and if sharp and colicky, a calculus on its way down the ureter, or clots passing down from a bleeding renal tumour.

(iv) Hæmaturia without other notable symptoms may be caused by practically any lesion of the urinary tract in its early stage, including stone and tuberculosis, but is most characteristic of an innocent papilloma of the bladder. It may also occur in various general diseases, among them the

of a modern urological clinic, it is to him that the patient turns for advice and assistance. The diagnostic problem is of great interest and may be illuminated by consideration of the following :—

(a) The age and sex of the patient.

(b) The physical character of the blood passed.

(c) The presence or absence of associated symptoms.

(a) *In children* the most common causes of hæmaturia are nephritis, which is associated with albuminuria, œdema and pyrexia and other features, and pyelitis, often confused with pneumonia or the acute abdomen, and distinguished by pyrexia, abdominal pain and strangury. General diseases such as scurvy, rickets, purpura, hæmophilia, leukæmia and severe fevers cause hæmaturia as one of many clinical features.

*In the young and middle-aged adult*, although nephritis and pyelitis and the general diseases mentioned above may be to blame, special consideration should be given to tuberculosis of the urinary tract, stone and urinary infections, including gonorrhœa. Although uncommon in this country, bilharziasis is a frequent cause of hæmaturia in the near East, where many British soldiers served during the late war. This possibility should therefore be kept in mind, particularly if a returned soldier complains of blood in the urine, painful micturition and rectal symptoms.

*In late middle age and in elderly patients*, chronic nephritis, hypertension and other cardiovascular diseases must be borne in mind, but the patient has entered that age when new growths are common and special attention should be paid to the possibility of tumours of the kidney or bladder. Bladder neoplasms, rare under the age of thirty-five, often give rise to symptomless hæmaturia, are innocent in their early phase, but tend to become malignant as time goes on, and to be malignant from the first in the elderly. In elderly men simple or malignant enlargement of the prostate is a common cause of hæmorrhage, and in both sexes chronic cystitis causes bleeding, but usually with severe bladder symptoms.

(b) Some idea regarding *the source of the blood* may be gained by examining a freshly passed specimen. Blood retained long in the urine, especially if acid, is of a brownish smoky tint, suggestive of an origin high up in the tract, from the kidney, pelvis or ureter. From the bladder the blood is brighter in colour, unless retained for long in an acid urine. It is usually more profuse from the bladder than from elsewhere in the urinary tract and sometimes forms large clots. If blood appears at the head of the stream it is from the prostatic urethra or trigone, and if it follows after a reasonably clear efflux and is profuse and bright red, a new growth of the bladder is almost a certainty; soft simple papillomas bleed more freely and unobtrusively than carcinomas which disturb the bladder function. A great loss of blood suggests a soft and vascular neoplasm, and if accompanied by renal colic and worm-like casts in the urine, points to a renal hypernephroma or carcinoma. A medium loss of blood without clots suggests a more chronic

- (c) Leukæmia and other blood dyscrasias
- (d) Purpura
- (e) Hypertension
- (f) Scurvy
- (g) Hæmophilia
- (h) Scurvy
- (2) *Urinary tract affections*
  - (i) Renal: (a) Malignant or benign tumours
    - (b) Injury
    - (c) Calculus
    - (d) Tuberculosis
    - (e) Acute pyelonephritis
    - (f) Hydronephrosis
    - (g) Polycystic disease
    - (h) Oxaluria
    - (i) Nephritis (acute or subacute)
    - (j) Drugs; hexamine, sodium salicylate, sulphonamides
  - (ii) Ureteral: (a) Calculus
    - (b) Malignant or benign tumours
  - (iii) Vesical and prostatic: (a) Papilloma or carcinoma of the bladder
    - (b) Bilharziasis
    - (c) Prostatic hypertrophy or carcinoma
    - (d) Tuberculosis of the bladder or prostate
    - (e) Calculus or foreign body
    - (f) Acute cystitis
    - (g) Trauma
  - (iv) Urethral: (a) Acute urethritis
    - (b) Impacted calculus
    - (c) Trauma
    - (d) Stricture
- (3) *Disease of neighbouring organs involving the urinary system*
  - (a) Carcinoma of uterus; vagina; rectum
  - (b) Diverticulitis

This list, containing many diseases of which hæmaturia is but an unimportant symptom, is offered as a guide to the general practitioner when he narrows down his diagnostic possibilities. In leukæmia or carcinoma of the uterus, for example, it is obvious that hæmaturia is unlikely to be the presenting symptom, but nevertheless such conditions must be included.

#### CONCLUSION

Hæmaturia varies in intensity from a few red blood cells in the urine, invisible to the naked eye, to the black and frightful waters so vividly described by Montaigne as accompanying the passage of his own sharp and craggy stone. It may be of little importance, as, for example, when due to oxaluria, but it may be a most sinister symptom, as when it arises from a malignant tumour of the kidney or bladder. On no account should it be passed over without investigation, or the patient lulled into false security by reassurances without accurate diagnosis. In some cases the general practitioner can trace the source of the blood accurately, in most cases he can narrow down the possibilities to a few diseases, and in the rest he should not hesitate to take advantage of all the help the specialist can give him.

anæmias, leucæmias, purpura and scurvy. Finally, there is a condition called essential hæmaturia in which intermittent or continuous hæmorrhage occurs. Only after the most careful and repeated search and after all organic lesions have been excluded should the diagnosis of essential hæmaturia be made.

#### CLINICAL EXAMINATION OF THE PATIENT

It is unnecessary to dwell on the supreme importance of history taking and clinical examination of the patient. Patience and encouragement are required to elucidate all the details which make accurate diagnosis possible. General physical examination, including estimation of the blood pressure and local investigation, not forgetting rectal palpation, should be orderly and thorough. Inspection and chemical examination of the urine, although they give much information, are not enough and, when the practitioner has not his own equipment, a mid-stream specimen from the male and a catheter specimen from the female should be sent to the laboratory in a sterile bottle. By consideration of the history, signs and urine reports the diagnosis can usually be narrowed down, but to be taken a stage further, special examinations are needed.

(1) A plain X-ray of the urinary tract after thorough preparation gives information regarding stones and secondary deposits of growths in the spine.

(2) An intravenous pyelogram is of the greatest value, for it reveals the secretory power of each kidney, the shape and size of the renal calyces, pelves, ureters and bladder. Distension and distortion can be seen provided the kidneys secrete sufficient opaque medium to throw a shadow.

At this stage the general practitioner has carried the case forward as far as he can to accurate diagnosis and has done his duty. Further elucidation of the case by cystoscopy and other diagnostic procedures and treatment may require the services of a urologist to whom, if need be, the patient should be referred with a case record and comments. Such reports and comments are not only of the greatest assistance to the specialist, but invariably give pleasure to giver and receiver.

#### CAUSAL FACTORS

It is usual in writing upon such a symptom as hæmaturia, to set down early in the article a list of the affections which may cause it. Taking such a list as a first step implies an inverted approach to the case of hæmaturia. The main symptom must be studied first and its implications considered. Further questions and the examination of the urine carry the practitioner a stage further, and then clinical examination, general and in detail of the suspected area, and the special examinations lead to certain tentative conclusions. The list may then be consulted:—

(1) *Systemic diseases*

(a) Renal infarction in endocarditis

(b) Arteriosclerosis

- (c) Leukæmia and other blood dyscrasias
- (d) Purpura
- (e) Hypertension
- (f) Scurvy
- (g) Hæmophilia
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- (2) *Urinary tract affections*
  - (i) Renal: (a) Malignant or benign tumours
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# GENITO-URINARY DISORDERS IN INFANCY AND CHILDHOOD

WITH SPECIAL REFERENCE TO ENURESIS

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THE purpose of this commentary is to underline the commonplace, without the confusion of a comprehensive survey in a specialist field. Whereas in the adult a clinical history almost always reveals a pointer to the urinary system when this is at fault, the infant rarely gives a clue. He is expected to be wet until he reaches perhaps the age of two, after which he is often cruelly labelled enuretic and functional unless he is dry. Organic disorder may thus pass unnoticed until destruction has occurred. Adult and pædiatric urology are therefore comparable only in the general principles.

There are two main presenting groups of urinary disorders in the young:— (1) those with extra-urinary symptoms, and (2) those with primary urinary symptoms. Convulsions, vomiting, and enteritis are common symptoms of many general diseases, but each may be the only symptom of grave urinary disorder.

*Example:* Infant aged 3 weeks. One week's history of enteritis. Moribund on admission. Doubtful tumour in left loin. Condition thought to be infective enteritis: failed to respond to treatment. Blood urea 32 mgm. Excretion pyelogram (12 c.cm. 75 per cent. iodoxyl—at least half the adult dose is necessary) showed bilateral hydro-uretero-nephrosis. Pyelostomy was performed on the left under local anaesthesia, but after a temporary improvement death occurred at four weeks due to symptomatic enteritis.

In the most recent edition of Garrod, Batten and Thursfield (1947), Paterson and Moncrieff call attention to neonatal urinary infection, and state that examination of the urine will always give a clue, but of course many lesions are "closed" to one ureter and kidney; urinary infection is a complication of obstruction, and diagnosis is best before it occurs.

## SOME POINTS ABOUT THE HISTORY

To obtain information on frequency, dysuria, incontinence or the character of urinary expression, one has to depend upon accurate nursing or maternal observation. Often the vital question is "has the baby *ever* been dry, even for minutes?" The "dribbling" of retention overflow or true incontinence may be excluded by such a finding, although sometimes with chronic retention the infant bladder ejects a short proper jet at regular intervals instead of dribbling. Unless the stream is seen the actual passage of urine

may be in doubt in the newly born, as each change of nappy may reveal a stool as well.

*Dysuria* in tiny babies cannot be defined, but in older infants and toddlers a reluctance to pass water is sometimes the best indication that micturition is painful.

*Hæmaturia* is usually offered as a symptom without much cross-examination. Frank bleeding, though said by some not to occur, is often the presenting symptom of Wilm's renal embryoma. A drop of blood expressed at the end of the act is most commonly due to meatal ulceration (see p. 190).

*Frequency* in small children depends very much more upon the parents' ability to allow the child to retain, than upon the child's own mechanism and capacity. Mother may feel that the baby should be "potted" pretty often "to teach him to be clean and to save the washing." Frequently one hears the expression "he is dry if I catch him." Herein lies one method of avoiding enuresis, by regulated "holding".

In the special history for an older child with enuresis, many more important questions must be answered: it is essential to know if the child has *ever* had a dry night. So often mothers will insist on "never dry" and "always wet" when in fact the child has had dry periods. In seeking this part of the history there is frequently an argument between mother and child as to whether he has been dry since his last visit to the clinic, and deep psycho-seeking is not necessary to bare the conflict. It is also necessary to remember that the automatic micturition produced during the first year by the application of the cold "pot" at each feed may lead to a child being regarded as clean and dry. When cortical control takes over from this elementary reflex during the second year the "dry" child is sometimes misunderstood for his apparent relapse.

War-time evacuation, the domestic background, and the child's own social circle are all covered in the normal pædiatric history, but may have a vital bearing on some cases of enuresis.

#### WHAT TO LOOK FOR, HOW, AND WHY

Clinical examination and the knowledge of the significance of abnormal findings must, as in so many subjects, go hand in hand. Unless specific faults are searched for, they will be overlooked; the examination is therefore described.

*The abdomen.*—It is often necessary to hold the infant and examine him lying on his face or on his side; a feed should be available, as relaxation is essential.

The hernial orifices, the bladder, the kidneys, spleen and liver must be individually sought, and much patience is required. The examination should be repeated daily if the diagnosis is in doubt. The umbilicus should be everted to ascertain if it is dry or has a polyp or granuloma. The back must be examined for any evidence of spina bifida. During this phase of examina-

tion, the movements of the limbs will have been noted: is there spasticity in either leg? Probably by now micturition will have occurred and the examiner will have had the opportunity of observing its characters, and possibly of being anointed himself unless he is wary! Spina bifida occulta is a very common radiological finding in children and it has no proved clinical significance, in the absence of other neurological signs. More severe degrees of failure of fusion may be organic causes of enuresis (Campbell, 1937; Caffey, 1945).

*Phimosis*.—The foreskin has constant characteristics: the normal foreskin of a newly born baby cannot be retracted without force; if the urinary meatus can be seen to be patent that is sufficient; no surgical interference is necessary. If the meatus cannot be seen, the prepuce should be probed, and separated sufficiently to reveal the meatus: any personal inclination to stretch, strip back or remove the physiological protection of the glans against chemical dermatitis may be satisfied at a later date.

*Circumcision* is the only amputation ever performed at the request of a patient or his next-of-kin without any adequate medical reason being necessary. If at a month old the prepuce cannot be retracted readily, it is often necessary to free the adhesions with the flat end of a silver probe. There is conflict of opinion on the merits of circumcision, and many such operations have been performed when what was really required was a meatotomy. Whether stretching or circumcision is performed, the essential is to free the corona of adhesions. In the older child the presence of preputial adhesions, however small, causes eversion of the meatal lips during an erection. The urethral mucosa is thereby exposed to contact with the clothes and this irritation alone may cause reflex micturition, especially if the child is asleep. I have seen several boys relieved of the tedium of wet beds by the simple separation of such coronal adhesions. Re-adhesion must of course be prevented. Phimosis is not a disease of the neonatal period; it is normal.

*Meatal ulceration* with stenosis is probably the most common urinary disorder of childhood; it is certainly the most common cause of hæmaturia. The meatus may be small by nature or scarred from previous infection or trauma. Ammoniacal decomposition of urine actually burns the perineum and the characteristic thick, shiny, red, over-corrugated scrotal skin and prepuce—if it is still there—announce the diagnosis. The meatus is inflamed; it splits on micturition; a drop of blood is passed; screaming occurs and subsequently retention, abdominal pain, or reflex colic. The process is repeated by gumming-up of the meatus after each act.

The treatment is regular dilatation with a glass rod (such as used in ophthalmic departments), the use of boracic ointment as a protective, and the liberal use of boracic acid powder, and not the proprietary baby powders. If meatotomy is required, a snip with scissors towards the dorsum is kept open by a tiny catgut stitch passed through each lip. In the home, the

simplest suture is horsehair passed through a hypodermic needle inserted as a suture needle, but it requires removal after a week. In spite of the inconvenience, napkins should be discarded so that the urine is not held as a chemical fomentation against the skin. This condition rarely develops in breast-fed babies whose stools are acid. Sometimes an "attack" is induced by teething or some febrile disorder which concentrates the urine and excludes the infant from its daily ablution. Twistington Higgins (1939) has called attention to the frequency and pathology of this condition.

*Hypospadias.*—If, instead of being tight and conical, the prepuce is lax and wrinkled, especially on the dorsum, hypospadias is most probably present. The perineal or split-scrotum type is obvious and is discussed later with hermaphroditism. When the meatus is at the peno-scrotal junction this is usually clear, and chordee (a fixed kyphosis of the penis due to aplasia of the corpus spongiosum) is present. The minor degrees of hypospadias are often missed. On superficial examination the meatal dimple may look very like a true meatus, whilst the only outlet is a pin-point orifice at the frænum. Likewise, the meatus itself may be double—a blind dorsal pocket separated from the hypospadiac meatus by a thin septum. The direction of the stream should therefore be noted; it may be double. This does not matter until the child attempts to use a pot and then surgery is essential to coordinate the two streams.

*The undescended testicle.*—The scrotum and testes vary a great deal within normal limits. Testes in the small child are highly retractile and a diagnosis of imperfect descent should not be made unless the fingers, slid down over the inguinal canal, fail to extrude the testis into the scrotum. The cold hands of the school medical officer, hurriedly applied to the nervous scrotum, cause the testes to retreat like a snail to its shell, and the normal child is forthwith despatched to a specialist centre. The ectopic testis—that which has turned up into the superficial inguinal pouch—will require operation, and both undescended and ectopic testes should be brought into the scrotum by operation before the age of twelve. Complicated operative technique is not required, and hormone therapy is of doubtful value. The spermatogenic function of such testes is always in doubt owing to a frequent coexisting failure of urogenital fusion between the testis and epididymis (Badenoch, 1946).

*Neonatal hydrocele.*—The diagnosis is as clear as the tumour is translucent. The treatment is to do nothing. Spontaneous absorption is common and if this does not occur by three months, aspiration and perhaps operation may be required.

*The female perineum.*—Adhesions occur between the labia minora and these are easily separated with a probe. The imperforate hymen is a rarity, and I have seen a false hymen superficial to both the urinary and vaginal meatus with a small common opening which would not admit a II F cystoscope. Such a barricade to free drainage had led to retention of urine

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in the vagina and subsequent infection. The importance of such anomalies lies in relation to urinary infection. Grosser defects occur but are rare and more serious.

*Ectopia vesicæ and epispadias.*—These grosser defects in either sex are only too apparent. The former is associated with a variable degree of symphyseal separation and this pelvic instability ultimately gives the child a characteristic gait. Whereas in the past it has been common practice to postpone surgical treatment until after the age of two, when the urinary output falls and ureteric transplantation is practicable, an attempt is now being made to close the pelvis by vice-compression as early as possible and subsequently to reconstruct the bladder and the bladder neck, to avoid transplants.

*Hermaphroditism.*—The diagnosis of sex is sometimes very difficult; the common error is for a boy with a miniature penis, split scrotum and perineal hypospadias to be mistaken for a girl, and in the last six months two such unfortunate boys have been seen, reared to puberty as girls before the error was discovered. The half scrotum is very like a labium and sometimes the testis cannot be felt in it. True dual sexuality does occur, and a laparotomy to determine the presence or absence of the uterus is sometimes essential. This condition is only mentioned as a warning to prevent doubtful babies from being wrongly registered, without expert advice and absolute diagnosis.

*The anus.*—There are many abnormalities of which the most common has a bearing on urology in the girl. The normal anal dimple, with its corrugator action, is present, but the rectum actually opens into the "fourchette". This may pass unnoticed until about the age of three months, when the thicker stools begin to be held up and the baby is seen to be straining.

#### ON THE COLLECTION OF URINE, AND INSTRUMENTATION

It must be remembered that the infant usually has a layer of zinc cream or damped-down baby powder on the genitalia. The use of a mercurial antiseptic in watery solution as a cleaning agent before catheterization or instrumentation is as ridiculous as "water on a duck's back"; C.T.A.B. is most effective and harmless, or soap and water if no other detergent is available. If a sterile tube is strapped over the penis the antiseptic solution must, of course, first be washed away with water. For non-sterile specimens or for the daily volume measurement, tubes may be strapped on either sex, and a suitable *waterproof* strapping may be used ("Sleek plastic strapping"—Herts Pharmaceutical Products). Undoubtedly catheterization is the best method of obtaining a satisfactory specimen in both sexes, and the residual urine can likewise be measured. This latter quantity means very little in the tiny baby, because even those bladders which are obstructed by urethral valves have only a small capacity, and are large from hypertrophy rather than dilatation. It is often better to use a nasal catheter which has a more pointed tip than the average urethral one.

## ENURESIS

Three to four years may be taken as the top-line for expected dryness, both day and night. The problem is not quite the same in the child as in the adult. The literature on this subject is abundant and confusing. Several known etiological factors have already been mentioned. Different authorities quote figures as varied as 5 to 60 per cent. of cases being due to organic uropathy. All practitioners are acquainted with cases of gross mal-training, of obvious functional origin, or due to frank infection or organic nervous disease, such as cerebral palsy or meningocele. Between these extremes lies a morass of undiagnosed cases. The clinical history may reveal some etiological clue—war-time evacuation, change of school, the birth of a brother or sister, or a severe illness. Many cases are simply due to coronal adhesions described above, and these may be dramatically cured by a single manipulation.

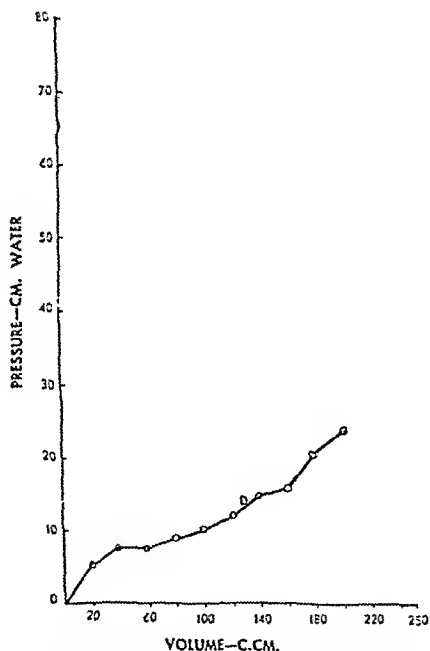


FIG. 1.—Age 7 years. Normal; no inhibited contractions; no sensation. Graph approximately 30°.

Full examination of the urinary tract and nervous system is essential if the simple remedies have failed. Digital examination should be done to estimate anal sphincter tone. In addition to urine tests and full radiological examination, the passage of sounds to assess urethral calibre, *cystoscopy* and *cystometry* are essential. The latter is a simple recording of the intravesical pressure-volume ratio when the bladder is being filled by a slow drip



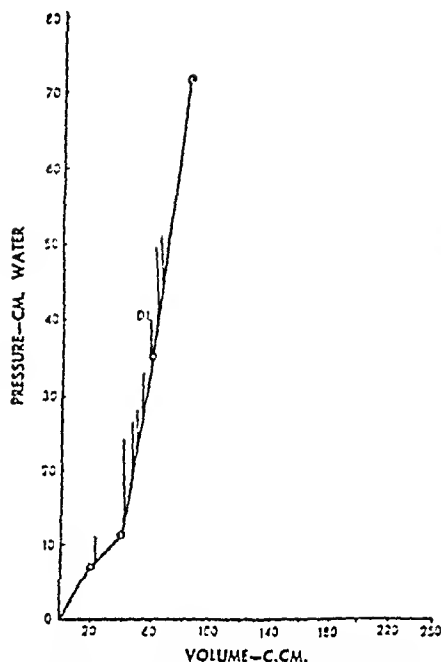


FIG. 2(a).—Age 5 years. High tension type (A). Several uninhibited contractions; high angled curve; "desire" accompanied by uninhibited contraction.

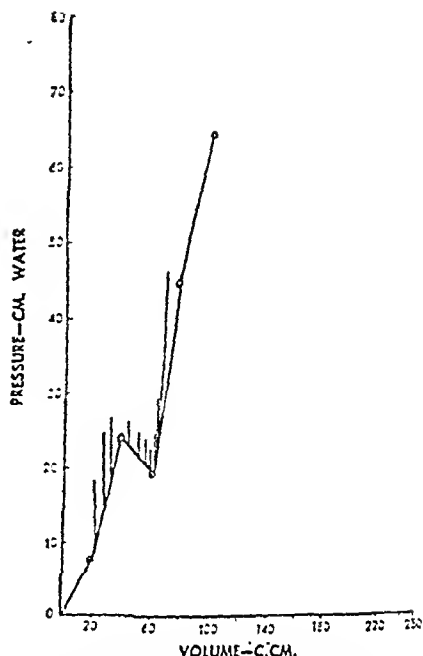


FIG. 2(b).—Similar high tension automatic bladder in a case of lumbo-sacral meningocele with paraplegia.

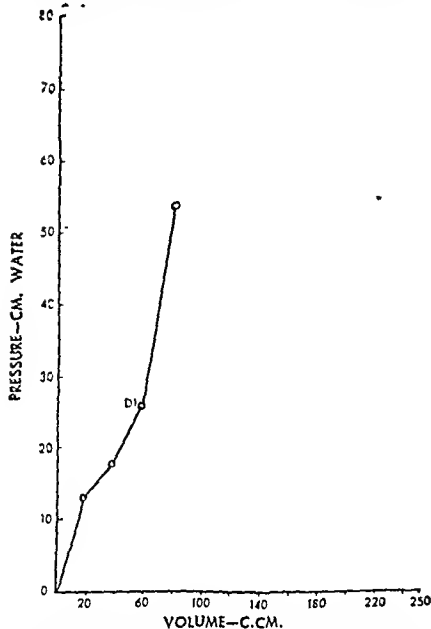


FIG. 3(a).—Age 8 years. High tension type enuresis without uninhibited contractions (A2). Normal sensation; "wet" every night.

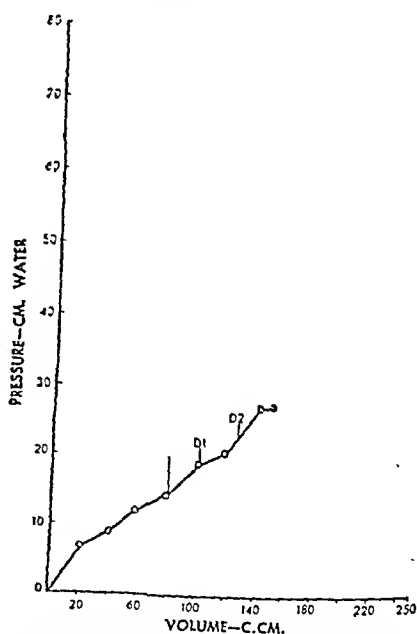


FIG. 3(b).—Same child after two months' treatment (two wet nights in eight weeks).

through a catheter. This has in the past been done in children by some urologists under anæsthesia for fear of producing a psychological trauma: such recordings are worthless because the main value of cystometry is to assess the sensory aspect of bladder function. Without it even the neurological examination is incomplete. It may be performed with perfect co-operation in most children, even down to the age of five, but the examiner must be prepared to win the child's confidence, and to use nursery terms which the child understands in the description of bladder function.

As the bladder fills, for example in a child of six, the pressure rises about 2 cm. for every 20 c.cm. introduced. There should be no bladder contractions. There is a first desire to micturate perhaps at 80 c.cm. This passes off, and returns probably at 120 c.cm., followed very soon by an irresistible desire which is accompanied by flushing of the face and finger movements. Most children can maintain absolute control of bladder pressure even when there is very marked discomfort.

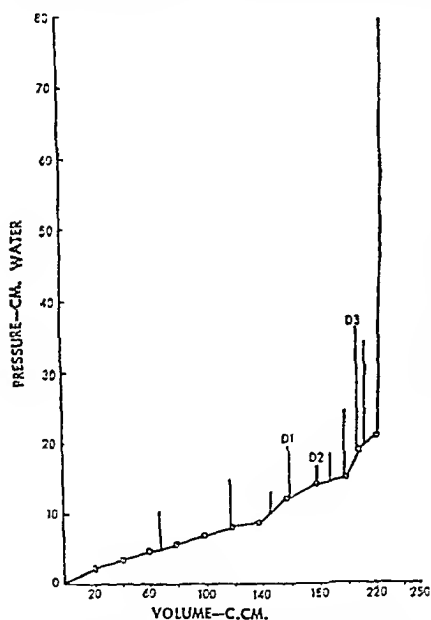


FIG. 4(a).—Age 10 years. Low tension adult type enuresis with many uninhibited contractions (B1). "Desire" accompanied by contraction.

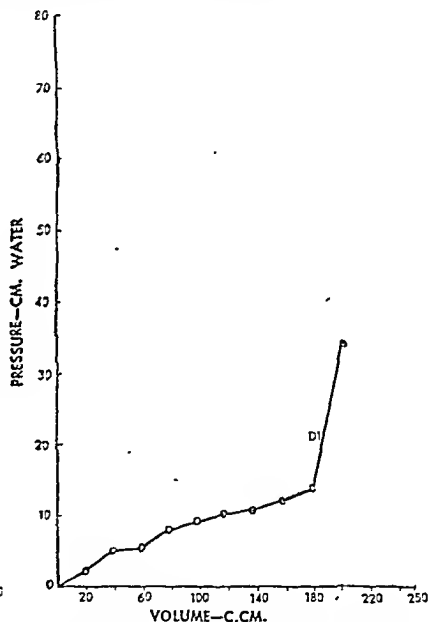


FIG. 4(b).—Same case after two months' treatment; showing control of contractions (B2 response).

A normal cystometrograph is shown in fig. 1. There are no uninhibited contractions. "D1" is the point where the first desire of the bladder to contract reaches consciousness. There is no contraction at this point. Fig. 2 shows the *high tension uninhibited* bladder of the infantile type in a boy of seven, with a comparative graph from a cord lesion. Fig. 3 represents a further stage in bladder function development—high tension, small capacity, but with no uninhibited contractions. This was a case of enuresis in a child of seven who responded to treatment. Fig. 4 shows the *low tension* adult type of bladder but with many uninhibited contractions—hence the enuresis, which responds to medical treatment.

These types all fall on a scale between the baby's bladder which is like that shown in fig. 2a—high tension, small capacity with reflex automatic emptying—and that shown in fig. 1, with the adult angled graph.

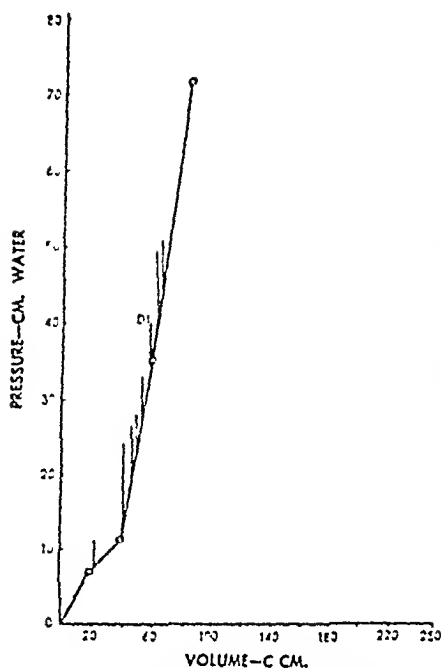


FIG. 2(a).—Age 5 years High tension type (A). Several uninhibited contractions; high angled curve; "desire" accompanied by uninhibited contraction.

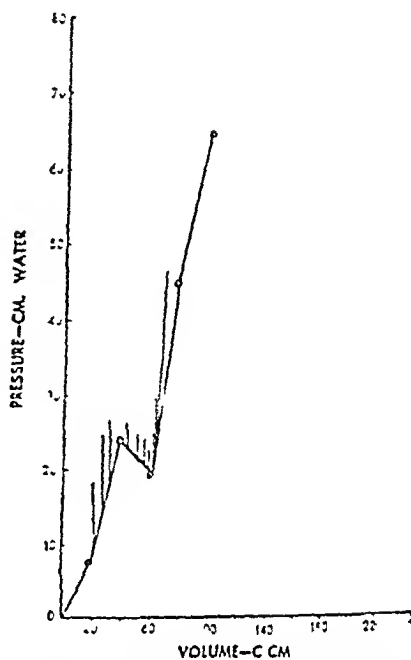


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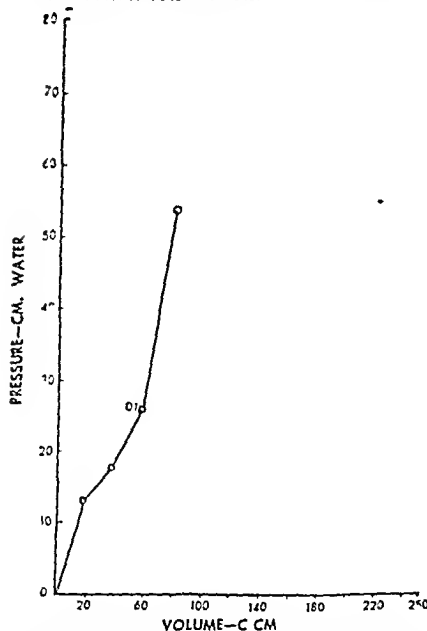


FIG. 3(a).—Age 8 years High tension type enuresis without uninhibited contractions (A2). Normal sensation, "wet" every night.

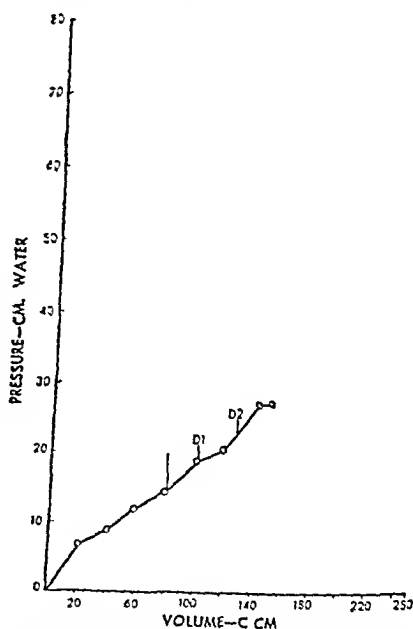


FIG. 3(b).—Same child after two months' treatment (two wet nights in eight weeks).

# TRENDS IN AMERICAN PÆDIATRICS

By J. L. HENDERSON, M.D., F.R.C.P. Ed.

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THE following impressions of trends in American pædiatrics were gathered by the author during a period of ten months' work in several of the principal pædiatric centres in the United States.

## INFANT FEEDING

*The decline in breast feeding.*—There has been a progressive decline in breast feeding in the United States, as in this country, during the last few decades. Some American pædiatricians deplore this decline but unfortunately many of them are indifferent. An attempt is being made to stimulate a revival of breast feeding in some centres, with more emphasis being placed on the psychological rather than the nutritional advantages. The causes of the decline of breast feeding are much the same in both countries, the chief one being ignorance of the medical and nursing professions about the physiology of lactation and the management of breast feeding. The causes of the greater decline in the United States would appear to be:— (1) Failure to teach the fundamentals of, and emphasize the importance of, breast feeding in many of the medical and nursing schools. (2) The failure of most doctors to show preference for breast feeding; it is the usual practice to ask mothers whether they intend to breast feed or bottle feed their babies rather than to assume that they will breast feed their babies unless there are clear medical indications to the contrary. (3) The greater aversion of American women towards breast feeding, which is often regarded by them as atavistic, and incompatible with life in a progressive modern society. (4) More advertisement of dried and evaporated milk preparations. (5) The better economic status of the average American family: the incidence of breast feeding tends to vary inversely with economic status in both countries.

*Types of artificial feeding.*—The greatly superior safeguards against tuberculous milk in the United States would seem to favour the use of fresh milk for artificial feeding; but, chemically, some of the milk produced in the United States is less suitable for infant feeding than British milk, because of its higher fat content resulting from the popularity of Jersey and Guernsey cows. This accounts for the popularity of evaporated homogenized milk in which the finely emulsified fat is more easily digested than in dried or fresh milk.

*Early introduction of mixed feeding.*—It has become fashionable in the United States to introduce starch and vegetable foods into infant diets at an earlier age than in this country. Starch foods, particularly, are often introduced at two to three months of age in contrast to five or six months in Britain. Such an early introduction of starch is not intended by nature,

For descriptive purposes therefore enuretics can be segregated into four categories :—

- (A1) High tension, uninhibited
- (A2) High tension, inhibited
- (B1) Low tension, uninhibited
- (B2) Low tension, inhibited—normal cystometric response

In treatment, if organic disease is excluded, the high tension (A) type should be trained by day at first to "empty" every hour, then every one-and-a-half hours, and so on, stepping the time up every few days. This is tedious for all concerned, but these types of nocturnal enuresis often have a concomitant diurnal frequency which is quite unregulated. Several of those with normal readings and reactions have become dry following cystometry, as have some of the (B) uninhibited type. In two cases in which it was thought that the sensation was impaired, cystometry, or rather catheterization, has been followed by a dry spell; in one of complete day and night dribbling there was control for two days, and in the other (nocturnal) the boy was dry for a week "until the soreness went off"!

Many are helped and some are cured by *drugs*. Some relapse when the drug is omitted. A specimen dose for a child of six is ephedrine hydrochloride,  $\frac{1}{4}$  grain (16 mgm.), at bedtime, or at 10 p.m. if the child is lifted and is usually dry then. Dry extract of belladonna,  $\frac{1}{2}$  grain (32 mgm.), may be added, and if the child is wet by day as well, then a morning dose should be given.

Hospitalization is resorted to if short-term out-patient treatment fails, and many a child becomes dry in hospital.

### CONCLUSION

There is no golden rule, no psychiatric or urological panacea. The "wet" child is a problem, but should always be regarded as a *physical* problem until proved otherwise. The child's background, his parents, or his teacher may be at fault, but his bladder is an intricate mechanism, with which environment can only interfere at a high level. Treatments are as numerous, and many as absurd but perhaps as effective as those for warts. Enuresis is, however, a big economic problem and may determine the ruin of a child's career and frustration of the parents' ambition. It must be regarded therefore as an organic disorder, whatever the genesis may be.

I should like to acknowledge the help and stimulus of Mr. T. Twistington Higgins, and other members of the staff of the Hospital for Sick Children, under whose care have come a number of the cases which form the clinical basis of this work.

### References

- Badenoch, A. W. (1946): *Surg. Gynec. Obstet.* 82, 471.
- Caffey, J. (1945): "Pediatric X-ray Diagnosis," Chicago.
- Campbell, M. F. (1937): "Pediatric Urology," New York.
- Higgins, T. Twistington (1939): *The Practitioner*, 142, 437.
- Paterson, D., and Moncrieff, A. (1947): Garrod, Batten and Thursfield's "Diseases of Children," 4th edition, London.

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since only small amounts of amylolytic enzymes are secreted in the early months of life; but the small amount usually given, though unnecessary, appears to be satisfactorily digested and to do no harm, provided its rachitogenic property is covered by an increased intake of vitamin D. There is a better case for the early introduction of sieved vegetable, which partly compensates for the deficiency of iron in cow's milk, but it seems unnecessary to introduce this before the age of four to five months.

Intensive advertisement by the manufacturers of infant foods, and an uncritical acceptance by doctors and parents of their merits, are the principal reasons for the early introduction of mixed feeding in the United States.

#### PROPHYLACTIC IMMUNIZATION OF INFANTS

A larger proportion of infants and children receive prophylactic immunization in the United States than in Britain. This is achieved by a greater use of judicious propaganda, by compulsory immunization in some areas, and through the less conservative attitude of the average American towards modern scientific procedures. Most infants are immunized against smallpox, diphtheria, tetanus and whooping-cough, whereas in Britain only smallpox and diphtheria immunization is routinely practised. It is now customary in the United States to use diphtheria toxoid and tetanus toxoid in combination. A triple preparation consisting of combined diphtheria-tetanus toxoid and alum-precipitated pertussis vaccine was introduced a few years ago and is gaining in popularity. It is not yet being used on a very large scale, as some investigators have shown that a lower whooping-cough antibody level is induced by this preparation than by pure pertussis vaccine. A triple immunizing preparation capable of giving results comparable with individual preparations will probably soon be developed and would have several advantages. Experience in America has shown that the use of this triple antigen leads to a higher rate of immunization in the community, because parents are much keener to have their infants immunized when protection against several diseases can be achieved simultaneously with so few inoculations. Moreover, less apprehension is engendered by the smaller number of injections, and it is more economical for parents and public health authorities.

*Whooping-cough immunization (active).*—It is generally agreed in the United States that whooping-cough immunization is a valuable procedure. None deny that its prophylactic effect is less reliable than that of diphtheria or tetanus toxoid, but there is ample support for the contention that it can be relied upon either to prevent the disease entirely in the majority of cases or greatly to alleviate its severity in the remainder. The confidence which is placed in whooping-cough immunization in the United States is not shared by most British authorities, who have found the procedure disappointing. The explanation for such widely divergent results must surely

depend upon variability in potency of pertussis vaccines and, possibly, on the dose and the method of immunization.

In 1945, McFarlan, Topley and Fisher conducted a field trial of the procedure in England for the Medical Research Council. They used a saline suspension of smooth (phase 1) recently isolated cultures of *H. pertussis*, and the disease proved to be as frequent and as severe in immunized cases as in controls. The type of vaccine used was probably the reason for this disappointing result, which has been too widely accepted in this country as a final condemnation of the procedure. It is now agreed in the United States that fluid vaccines, such as used by McFarlan *et al.*, are less effective than alum-precipitated vaccines which exert a much more prolonged antigenic stimulus. Moreover, larger doses, amounting to a total of 100,000 million organisms or more, have been found to produce higher antibody titres. The Medical Research Council are again conducting large-scale field trials in England to assess the protective value of pertussis vaccine in children between the ages of six and twelve months. In the first place two of the most successful American vaccines, Sauer's and Kendrick's, are being used. These vaccines have been chosen because of the disappointing results in previous controlled trials with British vaccines in this country. If these American vaccines prove satisfactory further trials will be made with new British vaccines.

Whooping-cough is common in the early months of life and the mortality rate is maximal at that time. It would be a great advantage if successful immunization could be carried out in the early weeks of life instead of after the age of six months. It is therefore most encouraging that several workers have recently shown that satisfactory early immunization can in fact be achieved. It was formerly believed that immunization with pertussis vaccine in the early months of life produced a poor antibody response and that an optimal response did not occur until the age of six to nine months, but recent investigations have shown that alum-precipitated pertussis vaccine is effective in young infants (Sako, 1947; Waddell and L'Engle, 1946).

Sako concludes: "Contrary to popular opinion, young infants are able to produce antibodies as a result of pertussis immunization just as well as older children. In the immunization of these young infants, prolonged antigenic stimulus as afforded by alum-precipitation is necessary for efficient antibody production". Following immunization with this preparation Sako found that the agglutinins climbed to a plateau in two to four months after completion of the series of inoculations and remained unchanged for at least three years. A stimulating dose eight to twelve months after completion of immunization in young infants raised the agglutinin titre to a higher level within a month and maintained that level for at least two years. Sauer (1946), a leading authority on whooping-cough immunization, states: "It has been firmly established that for infants less than six months of age only alum-precipitated pertussis vaccine should be used". All children who have been immunized in infancy should be given a single stimulating dose before entering a kindergarten or starting school.

The results of the current re-trial of pertussis immunization in England will be awaited with high hopes in view of the prestige enjoyed by this procedure in America and elsewhere.

Immunity to whooping-cough can be demonstrated by a simple skin test or by a complement fixation test. Although less sensitive, the skin test is more satisfactory for routine use; it should be done two to six months



since only small amounts of amylolytic enzymes are secreted in the early months of life; but the small amount usually given, though unnecessary, appears to be satisfactorily digested and to do no harm, provided its rachitogenic property is covered by an increased intake of vitamin D. There is a better case for the early introduction of sieved vegetable, which partly compensates for the deficiency of iron in cow's milk, but it seems unnecessary to introduce this before the age of four to five months.

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shown that subclinical infection with the mumps virus is common, also that mumps is a common cause of aseptic (lymphocytic) meningo-encephalitis; Enders showed that it was the cause in two-thirds of a series of 88 cases. There was no parotitis in a substantial minority of this series. Fortunately, the prognosis, both immediate and ultimate, is good in this serious complication. Convalescent serum appears to reduce the incidence of orchitis but impracticably large amounts are necessary (Rambar, 1946). Gamma globulin prepared from convalescent mumps cases is an effective therapeutic agent, but standard gamma globulin is ineffective. A sensitive skin test for immunity to mumps has recently been developed by Enders and his colleagues.

*The fractionation of plasma protein.*—The chemical fractionation of plasma protein has recently been developed on a commercial scale in the United States. During the recent war Cohn and his collaborators at Harvard (1944), devised a technique for the concentration of human serum albumin from blood collected by the American Red Cross. In the preparation of this albumin other protein fractions were obtained, several of which have a valuable clinical application. The essence of the process of plasma fractionation is the precipitation of different plasma protein fractions by varying concentrations of alcohol at low temperatures. The various components of plasma protein and their clinical applications are represented diagrammatically in fig. 1 (p. 202), reproduced from an article on the chemical components of blood by Cohn (1947). It will be observed that some of the proteins are present in much larger amounts than others and each has a highly specialized function. The discovery of the process of plasma fractionation is a major advance in medicine.

*Gamma globulin and its value in measles and infective hepatitis prophylaxis.*—Gamma globulin or "immune serum globulin" must be differentiated from "immune globulin", which is a placental extract. The antibody functions of the blood mostly reside in the gamma globulin fraction of the plasma protein (fig. 1). In the gamma globulins are concentrated the antibodies to many of the common infections. The antibody content varies in kind and amount from one individual to another and from time to time in the same individual. Enders (1944) estimated the concentration of the great variety of antibodies which have been detected in gamma globulin preparations; most antibodies are concentrated 25-fold over the pooled plasma from which they are derived, and variations in the antibody titre are slight since the initial pool consists of the plasma from 2,000 to 4,000 donors.

Gamma globulin was shown, in 1943, to be the safest and most effective agent available for the prevention and modification of measles (Stokes *et al.*, 1944), although the immunization, being passive, is short-lived. It should be given within six or seven days of exposure. A dose of 0.1 c.cm. per lb. body weight will completely protect most susceptible individuals, and one of 0.025 c.cm. per lb. will result in mild measles in most cases (Janeway,

after administration of the final immunizing dose (Felton and Flosdorf, 1946; Felton *et al.*, 1946).

Whooping-cough vaccine is often given in the early treatment of whooping-cough as advocated by the manufacturers. It is quite useless when given in these circumstances because a good antibody level is not attained for two to four months, but if the patient has previously been immunized the antibody titre is rapidly augmented by the formerly sensitized tissues, and a boosting dose should be given.

Considerable attention has been directed to the occasional occurrence of reactions following pertussis immunization. A systemic reaction is more likely to follow the injection of plain than of alum-precipitated vaccine, because the former is rapidly absorbed; but a local reaction is more likely to follow injection of the alum-precipitated type which not infrequently produces a residual nodule and occasionally a sterile abscess. Abscess formation seldom occurs, however, if a careful technique is followed. Sauer (1946) recommends that strict asepsis should be observed and the vaccine injected through a dry needle into the deep subcutaneous tissues.

*Whooping-cough immunization (passive).*—Hyper-immune whooping-cough serum is regarded as a valuable prophylactic agent in whooping-cough contracts and a useful therapeutic aid in cases of whooping-cough. Many leading American paediatricians regard it as a life-saving measure in severe cases of the disease with pulmonary complications (Felton, 1945). There are two types of the serum, human and rabbit, and it is obtained after a high antibody titre has been induced by repeated inoculation with whooping-cough vaccine. Both types have given good results but the human serum is the more popular.

When the volunteers are bled each month a stimulating dose of vaccine is given. The antibody level is checked regularly and only those donors who maintain a very high level are retained as sources of the serum. The prophylactic dose recommended is 20 c.cm. intramuscularly repeated after three to five days; the therapeutic dose, preferably given intravenously, is three or more doses of 20 c.cm. to 50 c.cm., given at intervals of forty-eight hours.

Most of the commercial preparations of hyper-immune whooping-cough serum are not concentrated, but a gamma globulin concentrate containing the antibody fraction of such serum is marketed by the Cutter Laboratories, Berkeley, California, under the name of "hypertussis".

*Mumps immunization.*—Since the discovery of the mumps virus in 1936, and particularly since the technique of propagation of the virus in the developing hen's egg was discovered in 1945, a great deal of research has been done on the properties of the virus and the immunology of the disease (Enders, 1946). Enders *et al.* (1945) have recently demonstrated that inactivated (formalized) virus increases immunity in most cases, but probably not for a long period. These workers are experimenting with attenuated mumps vaccine with the hope that it may produce an efficient and permanent immunity. The complement fixation test technique has

1947). It has been found that removal of the fibrinogen does not destroy the anti-hæmophilic properties of the fraction. Hitherto, only the complete fraction has been used clinically. Although these developments have scarcely passed the experimental stage they are of general interest and raise high hopes of the early discovery of a rational and reliable agent for the control of hæmorrhage in hæmophilia.

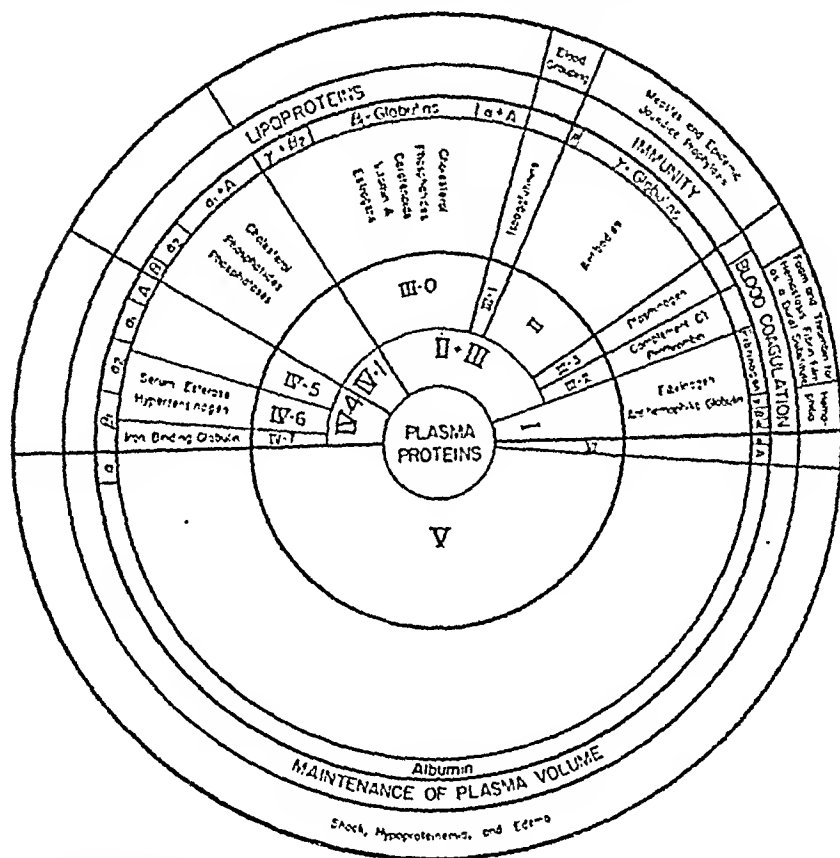
#### EPILEPSY: NEW CONCEPTS OF CLASSIFICATION AND THERAPY

The introduction of the electro-encephalograph, which demonstrates abnormalities in the rate and voltage of the brain waves, has helped to place the classification of epilepsy on a more rational basis. All large American hospitals are now equipped with this apparatus. Electro-encephalography has proved of particular value in differentiating the *petit mal* epilepsies, in which a very characteristic alternating spike and wave pattern occurs.

The three main groups of epilepsy are *grand mal*, *petit mal* and psychomotor epilepsy. *Petit mal* consists of a triad of seizures, each having characteristic clinical features. They are:—(1) *petit mal* seizures, in which there is a transient lapse of consciousness lasting from five to thirty seconds; (2) myoclonic epilepsy in which single contractions of the flexor muscles occur, and (3) akinetic seizures which consist of a sudden momentary loss of postural control (Lennox, 1945). The *petit mal* and myoclonic members of the group are more common soon after rising in the morning, and in states of emotion, and are much less frequent during physical and mental activity. Mentality is not impaired even by thousands of seizures. *Petit mal* seizures can often be precipitated by deep breathing. The *petit mal* epilepsies are predominantly seizures of childhood and adolescence, and tend to disappear spontaneously as adulthood is reached. Psychomotor epilepsy is distinguished by periods of amnesia with automatism, also mumbling, groaning, chewing movements, and tonic muscular rigidity. The *petit mal* group is much the most common form of epilepsy, and a combination of *petit mal* and *grand mal* is commoner than *grand mal* alone. Psychomotor epilepsy is less common than *grand mal*, with which it is not infrequently associated.

The treatment of *grand mal* and psychomotor epilepsy has been more effective in the past than that of the *petit mal* triad. The introduction of sodium-diphenyl-hydantoinate (synonyms:—epanutin, dilantin-sodium, phenytoin soluble) by Merritt and Putnam in 1938, was a great advance in the therapy of *grand mal* and psychomotor epilepsy, but the drug proved ineffective in the *petit mal* group and often increased the frequency of seizures. Epanutin is closely related to the barbiturates. Experience with it in *grand mal* and psychomotor epilepsy has shown that although superior to phenobarbitone, the best results are often obtained when these two drugs are combined. Moreover, the dose of epanutin may have to be increased close to the toxic level (ataxia, gingivitis) to obtain maximal results.

1944). The mild measles in patients receiving the latter dose of gamma globulin is similar to that formerly observed in patients immunized with convalescent serum or placental extract. Gamma globulin is also highly effective in the passive immunization of infective hepatitis contacts, but it



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FIG. 1.—A diagrammatic representation of the component fractions of plasma protein showing the natural functions and clinical uses of the various fractions (reproduced from a review by Cohn, 1947).

has little or no protective value in the other common infectious diseases.

There is now an ample supply of gamma globulin in the United States, but, unfortunately, it is difficult to obtain in this country.

*Anti-hæmophilic globulin.*—The introduction of plasma protein fractionation has intensified attempts to isolate the coagulation factor which is deficient in hæmophilia. Its chemical identity is still unknown, but it is clearly associated with the plasma globulins and is largely concentrated in fraction I which contains 60 per cent. of fibrinogen (fig. 1). Extensive studies on the anti-hæmophilic properties of fraction I are being carried out at the Boston City Hospital (Lewis *et al.*, 1946; Minot and Taylor,

It should be emphasized that these new anticonvulsant drugs should be used only under close supervision, preferably in hospitals and institutions, until more experience with them has been obtained and their toxic effects carefully assessed.

#### STREPTOMYCIN THERAPY

Like penicillin this drug is a product of mould culture, the organism in this case being *Actinomyces griseus*. In the intensive search for antibiotics which followed the discovery of penicillin, Schatz, Bugie and Waksman (1944) showed that a purified extract from *Actinomyces griseus* cultures, which they called streptomycin, has a high bacteriostatic effect on some gram-negative organisms and is therefore valuable in a number of infections which are not susceptible to penicillin. The method of administration and rate of destruction are similar to those of penicillin, but the dosage and expense of treatment are much greater. Last year a committee of the American National Research Council under the chairmanship of Chester Keefer (1946) reported the results of streptomycin therapy in 1000 cases of infections of various kinds. The committee reported that streptomycin is most effective in *H. influenzae* infections, urinary tract infections due to gram-negative bacilli, bacteriæmias, and meningitis due to gram-negative bacilli. The results in peritonitis were very promising. Those in typhoid, brucellosis and salmonella infections were disappointing and inconclusive.

This committee excluded *tuberculosis* from the investigation because of the long period required for such a study. In tuberculous mice and guinea-pigs a high percentage of cures is attainable with streptomycin. This raised hopes that at last an antibiotic had been discovered which would cure tuberculosis. Unfortunately, the results obtained in man are not comparable with those in laboratory animals, although the limited success achieved augurs well for the ultimate discovery of an antibiotic potent in human tuberculosis. In pulmonary tuberculosis in man the drug seems to inhibit extension of the process for so long as it is administered but exacerbation tends to occur when it is discontinued. Some success has been achieved in *tuberculous meningitis* in children. Several cases of this disease, hitherto invariably fatal, have recovered with streptomycin therapy, but a toxic effect, possibly caused by prolonged, routine intrathecal administration of the drug, may have been responsible for cerebral damage and mental defect in some. The trials being conducted with streptomycin in tuberculosis in the United States and in Britain will, in due course, enable a more reliable appraisal of the value of the drug in tuberculosis to be made. Keefer *et al.* found toxic reactions to streptomycin not infrequently. It is also clear that, as with penicillin, certain strains of organisms usually sensitive to the drug, such as *H. influenzae*, have a high degree of insensitivity to it.

Streptomycin is now being produced on a large scale in the United States and is available for routine purposes, but it is still only being pro-

In the *petit mal* group, phenobarbitone, the standard therapeutic agent, has not been very successful and often loses any effect it may have within a few weeks. There has recently been an intensive search for non-toxic, synthetic, anticonvulsant compounds which might prove more effective in epilepsy than present therapeutic weapons. Two compounds, discovered in the United States, have shown great promise in experimental animals, and clinical trials have proved their introduction to be notable advances in the treatment of epilepsy. The first of these drugs was synthesized by Spielman of the Abbott Laboratories and came on to the market last year under the trade name of "tridione" (Abbott). It can now be obtained in this country. Its formula is 3,5,5-trimethyloxazolidine-2,4-dione. Lennox (1945) in a large series of patients has found the drug "the most dramatic in its effect of any form of therapy attempted in *petit mal*". Numerous other investigators have reported good results in *petit mal*, but all have found the drug less effective than epanutin, phenobarbitone or bromide in *grand mal*.

Bearing in mind the fact that the *petit mal* epilepsies often disappear spontaneously, Lennox (1946), in a series of 145 cases, found the drug effective in controlling the seizures in a high proportion, and was gratified to find that in most cases the seizures failed to return when the drug was discontinued. Practically all of the group had received the old anticonvulsant drugs without important benefit. Tridione therapy relieved 33 per cent. entirely; 30 per cent. experienced a greater than 75 per cent. reduction in the number of seizures; 21 per cent. were helped only moderately, and 16 per cent. failed to benefit. The maximum reduction in seizures in most cases occurred in from one to three weeks. In a series of 67 cases of *grand mal* or psychomotor epilepsy the same author found that 45 per cent. were made worse, 35 per cent. were unchanged, and only 20 per cent. benefited. Photophobia was common and affected 33 per cent. of older children and adults, but young children only rarely. It was only really troublesome in bright daylight. Urticaria occurred in a few cases. Recently the rare but serious complication of agranulocytosis has been recorded.

In general, the drug appears to have a low degree of toxicity, but patients receiving it should be carefully supervised until a fuller assessment of its toxic effects can be made. Tridione is dispensed in 5-grain (0.32 gm.) capsules, and the dose is 5 to 30 grains (0.32 to 2 gm.) a day, according to age, divided into three doses.

The other new anticonvulsant drug is "mesantoin" (Sandoz). Its formula is 3-methyl 5,5-phenyl-ethyl-hydantoin, and it is not yet on the market in this country. It has proved a valuable alternative to epanutin and/or phenobarbitone in both *grand mal* and psychomotor epilepsy when poor therapeutic results or toxic reactions indicate a change.

Kozol (1946) in a series of 104 patients with *grand mal*, most of whom had failed to be influenced by epanutin or had shown toxic effects, found that 60 per cent. had a 90 per cent. reduction in frequency of attacks. The synergy found to exist between mesantoin and epanutin enabled better results to be obtained with a combination of these drugs than with either drug alone. Mesantoin has some hypnotic effect and should not therefore be used with phenobarbitone. It has an agreeable taste which is an advantage in children, also a low degree of toxicity although it tends to cause drowsiness and urticaria. It seems to be equally effective in psychomotor epilepsy but appears not to influence *petit mal*.

THE PROPHYLAXIS OF RECURRENT JUVENILE RHEUMATISM  
WITH LONG-TERM SULPHONAMIDE ADMINISTRATION

A number of American workers have advocated the regular administration of a small dose of one of the sulphonamide drugs up to the age of puberty in children who have suffered from acute rheumatism. The rationale of this long-term administration of sulphonamides is the prevention of streptococcal infections, such as tonsillitis and pharyngitis, in those who have had acute rheumatism, since the recrudescence of rheumatic symptoms is precipitated by a streptococcal infection and irreparable cardiac damage is more likely to occur during recrudescence than in the first attack. The dose of sulphonamide was small and varied between 0.6 gm. and 3 gm. per day, in divided doses. Some workers omitted the drug in the summer but the best results were obtained by giving it all the year round: sulphanilamide, which is cheaper for prolonged use, was mostly employed. The urine and blood should be examined regularly for toxic effects.

The results of American workers in this field have recently been reviewed by Barclay and King-Lewis (1945) and Rosenberg and Hench (1946), and they believe that the slight risk of toxic effects is heavily outweighed by the much lower recrudescence rate in those receiving the drug than in controls. In the ten series of cases reviewed by Rosenberg and Hench the recrudescence rate was 2.2 per cent. in patients who received the prophylactic drug and 13.7 per cent. in the controls. In the winter of 1943 the United States Navy carried out a mass experiment with sulphadiazine in an attempt to reduce the incidence of hemolytic streptococcal infections, especially rheumatic fever, among personnel in training depots. It was administered to 250,000 men for six months, each receiving 0.5 gm. twice a day, and an equal number were used as controls. The streptococcal infection rate was reduced by 85 per cent. and there were fourteen times as many cases of rheumatic fever in the control group as in the treated group.

THE SURGICAL TREATMENT OF CERTAIN CONGENITAL  
MALFORMATIONS OF THE HEART AND GREAT VESSELS

Advances in this field have occurred rapidly since the demonstration by Gross in 1939 (Gross and Hubbard, 1939; Gross, 1940) that surgical obliteration of a *patent ductus arteriosus* is not only possible but usually successful. Formerly the differentiation of congenital cardiac defects, of which there are numerous types, was perhaps more of academic than of practical importance, as no therapeutic means were available in any type of lesion. Most were content therefore with a diagnosis of congenital defect of the heart, but such a diagnosis can no longer be regarded as satisfactory, since recent achievements in cardiovascular surgery have shown that the efficiency of the circulation can be dramatically improved in certain congenital defects of the heart and great vessels by surgical intervention. Only a small proportion of cases of congenital cardiac defect is amenable to surgical treatment, however, and there seems little prospect of the remainder, consisting mostly of septal defects, ever becoming so.

The surgical obliteration of a *patent ductus arteriosus* soon became a



duced on a very limited scale in Britain, where the available supply is controlled by the trials committee of the Medical Research Council.

### ADVANCES IN PARENTERAL FLUID THERAPY

Hitherto, standard parenteral fluid therapy has been directed almost exclusively toward the restoration of normal water and electrolyte levels in the extracellular fluids, but within recent years it has been demonstrated that concomitant restoration of normal intracellular electrolyte levels does not occur, particularly in the severe dehydration associated with diarrhoea.

Darrow (1946) has shown that the body potassium, which is mostly intracellular, becomes much depleted in severe diarrhoea owing to its excessive excretion in the stools. The stools in diarrhoea also contain a great excess of sodium and chloride, and these electrolytes are largely derived from the extracellular fluids where most of the body sodium and chloride reside. Half of the water in diarrhoeal stools is derived from the extracellular fluid, which contains two-sevenths of the body water, and half is derived from the intracellular fluid, which contains five-sevenths of the body water. Darrow has demonstrated that not only extracellular, but also intracellular electrolyte depletion can be restored within two or three days by giving a much higher concentration of potassium in parenteral electrolyte solution than was formerly considered safe or even necessary. He recommends the following parenteral fluid in the dehydration produced by diarrhoea:—

Sodium chloride	..	..	..	3 gm.
Potassium chloride	..	..	..	2 gm.
Molar sodium laetate	..	..	..	40 c.cm.
Water	..	..	..	710 c.cm.

Sodium laetate is included to counteract the acidosis which is the rule in diarrhoea. Because of the danger of heart block arising from too great an elevation of blood potassium, Darrow insists that satisfactory renal function must be ensured by preliminary infusion with physiological saline, also plasma or blood in severe cases, before the potassium solution is given. He also insists that the solution be given slowly for the same reason. Darrow reported more rapid recovery and a lower death rate with the use of this fluid in infantile gastro-enteritis, than with the standard parenteral fluids, such as physiological sodium chloride and Hartmann's solution (Govan and Darrow, 1946).

The therapeutic régime recommended by Darrow in gastro-enteritis was described by me in a recent number of this journal (Henderson, 1947).

Butler, Gamble *et al.* (1946) have recently emphasized the value of glucose in diminishing body protein and sodium loss, also the fact that it prevents the ketosis of starvation. In young children the sparing of body protein is optimal and amounts to 50 per cent. when at least  $1\frac{1}{2}$  gm. of glucose per pound per day is given. Half this amount of glucose produces optimal sodium sparing, also amounting to 50 per cent., thus diminishing extracellular water loss; moreover, it prevents ketosis.

The above amount of glucose is insufficient for maintenance requirements when no oral feeding is being given. Butler and Talbot (1944) recommend the use of 10 per cent. glucose solutions with the object of supplying the bulk of the calories necessary for maintenance from extraneous sources, and thus diminishing the inroads on the body's fat stores.

## References

- Barclay, P. E., and King-Lewis, F. L. (1945): *Lancet*, ii, 751.  
 Blalock, A., and Taussig, H. B. (1945): *J. Amer. med. Ass.*, 128, 189.  
 Butler, A. M., Gamble, et al. (1946): *Amer. J. Dis. Child.*, 72, 443.  
 —, and Talbot, N. B. (1944): *New Engl. J. Med.*, 231, 585, 621.  
 Cohn, E. J. (1947): *Ann. int. Med.*, 26, 341.  
 —, Oncley, J. L., et al. (1944): *J. clin. Invest.*, 23, 417.  
 Crafoord, C., and Nylin, G. (1945): *J. thorac. Surg.*, 14, 347.  
 Darrow, D. C. (1946): *J. Pediat.*, 28, 515.  
 Enders, J. F. (1944): *J. clin. Invest.*, 23, 510.  
 — (1946): *J. Pediat.*, 29, 129.  
 —, Cohen, S., and Kane, L. W. (1945): *J. exp. Med.*, 81, 119.  
 Felton, H. M. (1945): *J. Amer. med. Ass.*, 128, 26.  
 —, and Florsdorf, E. W. (1946): *J. Pediat.*, 29, 677.  
 —, Smolens, J., and Mudd, S. (1946): *Ibid.*, 29, 687.  
 Govan, C. D., Jun., and Darrow, D. C. (1946): *Ibid.*, 29, 541.  
 Gross, R. E. (1940): *Ibid.*, 17, 716.  
 — (1945): *Surgery*, 18, 673.  
 —, and Hubbard, J. P. (1939): *J. Amer. med. Ass.*, 112, 729.  
 Henderson, J. L. (1947): *The Practitioner*, 158, 83.  
 Janeway, C. A. (1944): *J. Amer. med. Ass.*, 126, 674.  
 Keefer, C. S., et al. (1946): *Ibid.*, 132, 70.  
 Kozol, H. L. (1946): *Amer. J. Psychiat.*, 103, 154.  
 Lennox, W. G. (1945): *J. Amer. med. Ass.*, 129, 1069.  
 — (1946): *J. Pediat.*, 29, 356.  
 Lewis, J. H., et al. (1946): *Blood*, 1, 166.  
 McFarlan, A. M., Topley, E., and Fisher, M. (1945): *Brit. med. J.*, ii, 205.  
 Merritt, H. H., and Putnam, T. J. (1938): *J. Amer. med. Ass.*, 111, 1068.  
 Minot, G. R., and Taylor, F. A. L. (1947): *Ann. int. Med.*, 26, 363.  
 Rambar, A. C. (1946): *Amer. J. Dis. Child.*, 71, 1.  
 Rosenberg, E. F., and Hench, P. S. (1946): *Med. Clin. N. Amer.*, 30, 489.  
 Sako, W. (1947): *J. Pediat.*, 30, 29.  
 Sauer, L. W. (1946): *Med. Clin. N. Amer.*, 30, 45.  
 Schatz, A., Bugie, E., and Waksman, S. A. (1944): *Proc. Soc. exp. Biol. Med.*, 55, 66.  
 Senn, M. J. E. (1946): *Amer. J. Dis. Child.*, 72, 95.  
 Stokes, J., Jun., Maris, E. P., and Gellis, S. S. (1944): *J. clin. Invest.*, 23, 531.  
 Waddell, W. W., Jun., and L'Engle, C. S., Jun. (1946): *J. Pediat.*, 29, 487.

routine procedure in large surgical clinics both in America and in this country. The best results are obtained between the ages of six and ten years, because time is allowed for stunting of growth and development, which usually occur, to be corrected during the remaining years of growth. The operation should also be done in adolescents and young adults, when the vessels are still healthy. The not infrequent complication of bacterial endarteritis increases the urgency for operation, since closure of the ductus cures this complication. Gross, at the Boston Children's Hospital, has now operated on a large series of cases of patent ductus arteriosus with an extremely low mortality and great benefit in most cases.

The next great advance in cardiovascular surgery occurred in 1945, when Blalock and Taussig, working at Johns Hopkins Hospital, introduced a surgical technique for improving the pulmonary circulation in cases of *congenital pulmonary stenosis*, including cases of Fallot's tetralogy, and other types of lesion in which there is a great diminution of blood reaching the lungs. Their results were highly encouraging. These workers have now treated a large series of cases; their death rate is low and the immediate results spectacular, although it remains to be seen whether the long-term results will be as satisfactory.

The operation consists of section of one of the subclavian arteries or the innominate artery, and anastomosis of the proximal end to an opening in the side of one of the pulmonary arteries. The pulmonary stenosis is thus by-passed and the lungs are flooded with an adequate amount of blood for oxygenation. The severe cyanosis associated with the condition disappears almost entirely and stunting gives way to rapid growth and development. The operation is usually done between the ages of four and eight years, and younger if the severity of the condition demands earlier intervention. The operation is a difficult procedure and it is not yet being practised on a large scale in many surgical clinics.

In the same year Crafoord in Sweden (Crafoord and Nylin, 1945) demonstrated that patients suffering from *coarctation of the aorta* of severe degree could be relieved of their symptoms, and provided with a good circulation, by resecting the constricted portion of the descending aorta. Gross (1945), also, early adopted this technique and has now treated a series of cases of coarctation of the aorta, most of them successfully.

#### CHILD PSYCHIATRY

More attention is now being given to child psychiatry and child psychology in both the United States and Britain, but their integration with paediatric practice, which is highly desirable, has probably reached a more advanced stage in the United States. In the principal American children's hospitals a well-trained paediatrician, who has later specialized in child psychiatry, is in charge of this branch of paediatrics, and works in close harmony with the hospital staff (Senn, 1946). This is an important development worthy of more attention in both countries.

The advice which the doctor may feel justified in giving as being in the best interest of the patient will depend upon the relative significance of many factors. The extent of human needs in respect of indoor ventilation, warming or cooling is determined by physiological processes and reactions as qualified by such factors as age, state of activity or rest, occupation, nutrition, clothing, health and habits. It is also desirable, although indeed it may seem unnecessary, to remind ourselves that outdoor climate, in the face of which indoor climate has to be adjusted and controlled, varies with locality and season. To a greater or lesser extent all these matters need consideration when dealing with specific problems of ventilation and warming or cooling in the home, the sick room, the hospital, or institution, but it will only be possible to deal with them very briefly in this article.

### PHYSIOLOGICAL CONSIDERATIONS

The ventilation of a room is often given in terms of the number of air changes per hour, namely, the total volume of fresh air entering divided by the cubic capacity of the room. During recent times it has become increasingly common to specify the actual number of cubic feet of fresh air required per person per hour. If this is done, it follows that opinions as to the adequacy or otherwise of ventilation must be based on some standard.

If the need for ventilation simply depended upon human requirements for oxygen, a very small air change or air supply would suffice: an adult sitting resting, for instance, breathes 15 to 20 cubic feet of air per hour. Of far greater significance in determining ventilation requirements, however, is the fact that the metabolic processes which respiration renders possible lead to the production of some 100 Kilocalories or 400 British Thermal Units\* of heat per hour. The maintenance of body temperature within the narrow range of normality around 98.4° F. demands the continuous loss of this quantity of heat to the environment, i.e., the indoor air and solid surroundings.

It has been shown that a thermally comfortable adult wearing ordinary clothes sitting in a room in which the air is practically still and at a temperature of 60° F. Dry Bulb and 50 per cent. relative humidity loses these 400 B.T.U.s. substantially as follows:—

- 46 per cent. or 184 B.T.U.s. by radiation to solid surroundings
- 30 per cent. or 120 B.T.U.s. by convection to the air
- 24 per cent. or 96 B.T.U.s. by evaporation of moisture from the lungs and skin

The loss of 120 B.T.U.s. by convection is of interest in connexion with the study of ventilation requirements, for it can readily be calculated from data used by heating and ventilating engineers that approximately 800 cubic

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\* 1 B.T.U. is the amount of heat required to raise the temperature of 1 lb. of water 1° Fahrenheit, hence 400 B.T.U.s. would raise a quart of cold tap water to boiling point.

# MODERN VIEWS ON VENTILATION, WARMING AND COOLING

BY PROFESSOR G. P. CROWDEN, O.B.E., T.D., D.Sc., M.R.C.P.

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THE fundamental needs of man change little with the passage of time, but the methods adopted to meet those needs are ever changing as scientific knowledge increases and successful application is achieved. With recent advances in physiological knowledge, better understanding of the requirements of the body is being attained, and in the case of ventilation old theories have given place to new and, to an increasing extent, the provision of ventilation in buildings in the purely engineering sense is being based on human needs and limitations as determined and defined by medical science.

The exchange of indoor air for fresh air from outside, which the term "ventilation" is usually understood to mean, inevitably involves a simultaneous exchange of heat, except in that most rare of circumstances when the outdoor and indoor air temperatures and humidities are the same. It follows from this that any attempt to deal with the subject of ventilation from the point of view of its significance to comfort and health of necessity involves consideration of heating, cooling, or even the complete control of the indoor climate by air conditioning in order to satisfy human requirements. This statement of fact is the reason for linking warming and cooling with ventilation in the title of this article. That thermal comfort depends in no small measure upon ventilation is common experience, for it is not unusual in our climate to hear even apparently healthy people raise objection in no uncertain terms to draughts from an opened door or a railway carriage window.

Ventilation in the sick room is one of the many human problems which the medical practitioner has to face up to, and in this connexion we recall the true story of the Aberdeenshire doctor whose patient, an aged farmer, gave the following unexpectedly devastating reply when asked why he had nailed fast the bedroom window contrary to advice given the previous day: "When I'm in I'm in, and when I'm oot I'm oot, I wulna' be oot when I'm in."

This reply merits careful consideration. The problem it presents must be analysed. The question must be asked: "Why did the patient object to the open window?" Was it likely that the increased volume of fresh air thereby supplied would be harmful?—no; was it because the more rapid air change, which the open window produced, chilled the room?—probably yes; or because the patient was unduly sensitive to cold?—probably yes; or because local increased air movement caused conscious cold discomfort?—this in all probability was the main reason for his objection.

*Minimum ventilation.\**—“(a) In living rooms and bedrooms a minimum fresh air supply of 600 cubic feet per person per hour is desirable for health and for the removal of objectionable odours. Providing flues are installed, either for solid fuel or gas appliances, this degree of ventilation will usually be secured whether the fires are alight or not; but in rooms with wall ventilators only, ventilation will frequently need to be increased by opening the windows.

In warm weather there is greater need for fresh air ventilation, but in cold weather a high rate of ventilation may cause draughts and necessitate excessive use of fuel in order to maintain desirable conditions of warmth.

(b) In kitchens in which cooking is done for a family of 5 or 6 persons, a ventilation rate of 1000 cubic feet per hour is necessary. A stove or gas cooker provided with an adequate flue and chimney would usually ensure this degree of ventilation.

(c) In halls and passages the complete replacement of air once per hour is adequate and air leaks through doors and crannies will allow for this.

*Desirable conditions of warmth.*—(a) The air temperature in the house should not fall below the range of 45–50° F., for if it does so condensation of moisture on walls may occur.

(b) Ranges of air temperatures

Living Rooms:—60–68° F. The temperature at foot level should not be much lower, certainly not more than 5° F. lower, than at head level. The walls and furnishings should be slightly warmer than the air, which is usually the case if there is some source of radiant heat, e.g., an open fire, in the room.

Bedrooms:—50–55° F.

Kitchen:—About 60° F.

Halls and Passages (day-time):—50–55° F.”

#### PRACTICAL CONSIDERATIONS

Although physiological considerations provide the basis for prescribing desirable standards for ventilation and temperature, the ways and means for the attainment and maintenance of such conditions, in any given instance, depend upon many physical factors all of which need to be taken into account by the heating and ventilating engineer. So far as heat is concerned, a building is rather like a leaky tank, the supply and cost of heating depending upon the level of indoor warmth to be maintained in spite of the outdoor climate.

It has already been pointed out that, from the practical point of view, problems of providing satisfactory ventilation and warmth are inseparable. Both involve considerations of air flow and heat flow in and out of buildings. Air flow must be such that the temperature of the mixed ventilation and room air remains within the comfort zone of 60–68° F. Heat leakage depends only in part upon air flow, for such factors as the thickness, material and construction of walls, floors, ceilings and roof, and the size, position and design of windows, as well as the temperature drop from inside to outside the building, profoundly influence the rate and amount of heat lost from a room by conduction, convection, radiation, and in some cases by evaporation if the walls are damp. These factors largely determine the cost of heating, or the cost of cooling, when the direction of heat flow is reversed, as in summer time or in the tropics.

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feet of air at 60° F. would be warmed to 68° F. in taking up this quantity of heat from the body. The figure 68° F. is used because it is the upper limit of the comfort zone for indoor air temperature, which has been shown to range from 60 to 68° F. for our climate when ordinary clothing is worn (Bedford, 1936). In this connexion it is of interest to recall that a temperature of 65° F. has long been recognized as a desirable standard for the sick room; in fact it is on record that it was adopted one hundred and fifty years ago by Dr. William Withering when his failing health necessitated the control of the indoor climate in his house near Birmingham. In summer, when the outdoor air temperature may be 70° F. or more, it is common experience that more ventilation is needed, the explanation being that at these higher temperatures greater quantities of air are needed to remove the same amount of heat from the body by convection.

Any gross departure from the percentage losses by radiation, convection or evaporation given above may lead to thermal discomfort. Thus, cold walls and uncurtained windows in winter time cause a sense of chilling due to excessive loss of radiant heat from that part of the body exposed to them. On the other hand, warm ceilings in top-floor flats and the radiation of heat from the inside surfaces of thin-walled hutments in summer may reduce heat loss by radiation to such an extent that conscious sweating is caused, unless convection losses are increased by fanning and additional ventilation.

Although body heat balance is now regarded as a major factor in determining ventilation requirements, it is not the only one. It would be outside the scope of this article to review historical studies, but a reference must be made to the work of Leonard Hill (1913) which finally disproved the view that the accumulation of CO<sub>2</sub> in crowded rooms was the cause of discomfort associated with bad ventilation.

About thirty-five years ago, at the London Hospital, Leonard Hill arranged for seven medical students and an observer to be hermetically sealed in a cabinet of 106 cubic feet capacity. After half an hour the CO<sub>2</sub> rose to 3-4 per cent., oxygen fell to 17 per cent., air temperature rose to 82-87° F. Dry Bulb with 80-85° F. Wet Bulb. The subjects became flushed and moist and experienced acute thermal discomfort which was relieved by switching on an electric fan. At the same time, an outside observer breathed the vitiated air from the chamber through a tube and experienced no discomfort or ill-effects.

#### MODERN STANDARDS

In the United States (Yaglou *et al.*, 1936, 1937) ventilation standards have recently been based on the amount of fresh air required to render body odours unobjectionable, and figures ranging from 420 to 2,280 cubic feet per person per hour have been advocated according to circumstance. It is of interest to note that 600 cubic feet per person per hour is given as the minimum air supply per person in living rooms in the *Post War Building Studies Report No. 19*, 1946, of the Ministry of Works, on "Heating and Ventilation of Dwellings". That report should be consulted for detailed information, but the following summary of some of the recommendations may be of interest.

*Minimum ventilation.*\*—“(a) In living rooms and bedrooms a minimum fresh air supply of 600 cubic feet per person per hour is desirable for health and for the removal of objectionable odours. Providing flues are installed, either for solid fuel or gas appliances, this degree of ventilation will usually be secured whether the fires are alight or not; but in rooms with wall ventilators only, ventilation will frequently need to be increased by opening the windows.

In warm weather there is greater need for fresh air ventilation, but in cold weather a high rate of ventilation may cause draughts and necessitate excessive use of fuel in order to maintain desirable conditions of warmth.

(b) In kitchens in which cooking is done for a family of 5 or 6 persons, a ventilation rate of 1000 cubic feet per hour is necessary. A stove or gas cooker provided with an adequate flue and chimney would usually ensure this degree of ventilation.

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*Degree-days.*—It has been found that in this country we do not usually light our fires until the mean outdoor temperature has fallen below  $60^{\circ}\text{F.}$ , and that on any day proportionately more heat is needed for every degree by which the outdoor temperature falls below that level.

These facts of common experience together with information available in the meteorological records of the British Isles have been used as a basis for determining the need for heating in any given locality. The "degree-day" has been adopted as the unit of need, i.e., a day on which the mean outdoor temperature is  $1^{\circ}\text{F.}$  below  $60^{\circ}\text{F.}$  If the mean outside temperature were  $55^{\circ}\text{F.}$  on any one day then that day would contribute 5 degree-days to the annual total for the locality, which is the sum of the degree-days for all days of the year. In *Post War Building Studies No. 19*, of the Ministry of Works, a chart of the British Isles has been published showing areas having the same degree-day heating load to a base temperature of  $60^{\circ}\text{F.}$  In the London Area the annual total amounts to 3,750 degree-days, whilst for Newcastle the figure of 4,750 is given. Until recent times, when the limited supplies and high prices of fuels have enforced attention, the economics of the heating of dwelling houses have received scant attention. On the other hand, in the case of large buildings such as hospitals, institutions and schools, the estimation of the annual cost of heating has been given very careful study. From data which are readily available the heating engineer can foretell at what rate heat must be put into a proposed building in order to keep it at any desired temperature above that of the outside air. It is usual to take as a reasonable basis for determining the necessary maximum output capacity of the heating installation the number of British Thermal Units required per twenty-four hours to maintain the indoor temperature at  $65^{\circ}\text{F.}$  when the air temperature outside is  $30^{\circ}\text{F.}$

As the degree-day value for a place is a measure of the number of cold days and also of the degree of cold, it is of use to the heating engineer in calculating the total annual demands on the heating installation in terms of equivalent hours at full load. That figure multiplied by the maximum B.T.U. output per hour of the heating installation, and divided by the useful B.T.U.s. yielded per ton of fuel, gives the total requirement of fuel per annum.

#### HOSPITAL VENTILATION AND WARMING

When considering the problems which have to be solved to ensure adequate ventilation and warmth comfort in hospitals, it is of particular advantage and interest to study actual cases of successful achievement resulting from the application of modern views and methods in very recent times. There are, in this country, many notable examples of good heating and ventilating practice in hospitals and institutions and no invidious comparison is intended in referring to the case of the St. Helier Hospital in Surrey. In spite of the exceptionally severe weather encountered during the winter of 1946-47, when the outdoor temperature stood on occasions at  $12^{\circ}\text{F.}$ , the indoor climate of this hospital was kept under control and the requirements for health and thermal comfort were maintained in the various departments. Wireless weather reports proved of value to the engineer in charge, as they enabled anticipatory action to be taken and the avoidance of any time lag in adjusting the heat supplied by the plant to the needs occasioned by variations in outdoor temperature. The following is an extract from a

detailed report on the engineering services of the hospital published in 1946\*.—

"Generally throughout the hospital natural ventilation is relied upon. All the larger wards have windows on both sides so that cross-ventilation can be arranged and ample window space is provided everywhere. Certain special rooms, however, are provided with mechanical ventilation. In both the main kitchen and the Nurses' Home kitchen, mechanical extract ventilation is provided, provision being made for fresh air to enter from outside through gratings at low level. Glazed hoods are built over equipment such as boiling pans and wet-steam ovens, where a considerable amount of steam is likely to be lost and the whole of the kitchen ceilings are sub-ceiled and connected to the extract fans, gratings being provided from the hoods and other positions in the kitchen to ensure proper distribution of the air. The air change provided is approximately twenty per hour. Fans on the roof of the building concerned exhaust air well above the level of the occupied rooms. In the main kitchen, special gas dampers are provided to enable the ducts supplying fresh air from outside to be closed in a gas attack, and a system of dampers in the fan room enables the direction of the air to be reversed in order to maintain a pressure in the kitchen under these conditions. The sterilizer rooms are all provided with extract ventilation to remove steam given off by the sterilizing equipment. Mechanical ventilation serves the whole operating suite. An inlet fan with air heater, washer and filter is provided on the roof, air being distributed to the various rooms through insulated steel ducting. The void under the theatre suite, in which all the various services are run, is utilized for extract purposes, and two extract fans are provided in this void discharging the vitiated air outside the building. The temperature of the air leaving the main inlet fan is maintained at 80° F., the air entering the rooms between 70° F. and 75° F. according to the loss from the duct. The heat loss from the structure is taken care of by panel heating. Each theatre and anæsthetizing room has a separate branch from the air supply, and in this branch is a supplementary heater controlled thermostatically from the operating theatre, so that in case of need the surgeon can increase the temperature up to 85° F. or 90° F.; that is to say, under normal conditions the temperature in the theatres will be between 70° F. to 75° F., but in case of need, this can rapidly be increased up to between 80° F. and 90° F. by increasing the temperature of the incoming air. The rooms provided in the out-patients' department for radiography and deep and superficial therapy are also ventilated by extract fans, the incoming air being warmed by heaters provided in casings in the fresh-air inlets."

#### INSTRUMENTS AND MEASUREMENTS

Complaints of bad ventilation, excessive or insufficient heating or cooling in a room or hospital ward may draw attention to unsatisfactory conditions, or the sense impression of the visiting physician may bring the existence of such problems to his notice. Again, in crowded rooms, schools or in offices, where the heating and the ventilation, or both, may be defective, there may be complaints of "no air" or "lack of oxygen" and undoubted signs of undue fatigue towards the end of the day. In such cases it is essential to take instrumental measurements which are calculated to reveal which particular physical factors in the indoor climate are the real cause of the complaints, and so indicate the nature and extent of the measures to be taken to ensure that conditions conform to accepted standards.

\* This extract from an article by L. Copeland Watts is quoted by permission of the Editor of the "Air Treatment Engineer" from p. 57 of a volume of collected papers published in 1946 under the general title:—"Engineering Designs for Re-Planning".

For convenient reference in practical use a recapitulation is given below of the conditions and standards which are at present accepted as satisfactory, and the instruments which may readily be used for determining whether or not such conditions are being maintained are indicated.

(1) Ventilation and heating should be controllable.

(2) Air temperature: 60–68° F. Dry Bulb: 65° F. being a good standard for the sick room and for general use. Measurement taken by whirling or swing hygrometer.\*

(3) Relative humidity: not greater than 70 per cent. which will be ensured if the Wet Bulb temperature of the air, as measured by the whirling hygrometer, is at least 7° F. lower than the Dry Bulb over the range 60–68° F. Tables for use with the whirling hygrometer, giving the actual relative humidity for the depression of the Wet Bulb in relation to the Dry Bulb are given in the publication referred to below.\* In this country the climatic conditions are such that unduly low humidities rarely occur; 30 per cent. is considered as the lower limit in the comfort zone for relative humidity in ordinary rooms.

In operating theatres in which the Dry Bulb temperature of the air may range from 70–85° F. the relative humidity should not be allowed to fall below 60 per cent. owing to the risk of static electrical discharges (e.g., from blankets) which may cause an explosion if anæsthetic vapour is present. Provided the depression of the Wet Bulb is not more than 9° F. the relative humidity will not fall below 60 per cent. It is most desirable that a recording hygrometer showing Dry and Wet Bulb temperatures should be installed in operating theatres.

(4) Temperature gradient: in rooms used for continuous occupation the Dry Bulb air temperature at foot level should not be more than 5° F. lower than at head level. Temperatures may be observed by thermometers suspended at 6 inches and 5 feet from floor level and left in position for at least 15 minutes.

(5) Radiant heat and cold: the surface temperature of walls, ceiling, and furnishings should not differ widely from the Dry Bulb air temperature. Useful but approximate measures of surface temperature may be taken by fixing the bulb of an ordinary thermometer to the surface by adhesive tape and applying a strip to the top of the stem to secure the instrument in position.

(6) Ventilation: a minimum supply of fresh air of 600 cubic feet per person per hour is at present accepted as adequate for ordinary rooms, although a much greater ventilation is desirable in hot weather, and in any situation where moist heat, objectionable odours or fumes may arise. The fresh air entering a room must be well distributed.

When mechanical ventilation is installed the ventilation may be calculated from the performance of the supply and extraction fans. In other cases an approximate measure of air change can be arrived at by estimating the concentration of CO<sub>2</sub> in the air of the room after prolonged occupation, or by determining the rate of decline in concentration of some tracer substance previously liberated in the room.

(7) Air movement: within the range of 60–68° F. Dry Bulb the air movement should be variable and range from 20–30 feet per minute. In winter time draughts under doors and down draughts from windows may cause chilling discomfort. Draughts may be detected and traced by the white fumes of titanium tetrachloride and the velocity measured by means of the kata thermometer and Dry Bulb temperature as the rate of cooling of the kata thermometer depends upon the temperature and local movement of the air.

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\* Instructions for the use of instruments and tables are given in *Medical Research Council War Memorandum No. 17, "Environmental Warmth and Its Measurement,"* by T. Bedford, H.M.S.O., 1946.

## CONCLUSION

That "necessity is the mother of invention" is being amply demonstrated by modern developments in housing, and among the many studies which are engaging the attention of town planners, architects, engineers, physicists, meteorologists, statisticians and medical scientists the subject of "district heating" is one which has aroused considerable interest. By district heating is meant the provision of heat and hot water from a central boiler plant to a whole housing estate. The possibilities of this form of heating, as an alternative to central heating or the individual warming of rooms in houses, are being explored by the District Heating Sub-Committee of the Heating and Ventilation Reconstruction Committee set up by the Department of Scientific and Industrial Research (1946).

Many problems in addition to those referred to in this article come up for consideration in a comprehensive survey of the factors concerned in ventilation, warming, cooling or air conditioning. Within the limits of the space available it would be of little value to attempt to deal with such questions as the special problems which arise, for example, in industry which have been discussed by Dr. Bedford in his article on "Ventilation and Heating" in *The Practitioner Handbook "Industrial Medicine"*, published in 1944. Again, the problem of the control of cross-infection in hospital wards is one involving many factors, as indicated in the *Medical Research Council's War Memorandum No. 11* published in 1944. It is important to bear in mind that experience has shown that good cross-ventilation is one of the best methods of controlling air-borne infection, and that adequate provision for this must be made not only in planning the construction of hospitals but by ensuring that the most effective use is made of the heating system in cold weather in order to counter what may otherwise prove to be an irresistible temptation to cut down ventilation in the interests of thermal comfort.

In this article we have deliberately confined ourselves to the consideration of broad general principles governing modern practice in ventilation and heating. We have attempted to outline the main physiological factors determining the need for ventilation and the thermal conditions in the indoor climate which have been shown to be compatible with comfort for the vast majority of people in this country, and to indicate how those conditions can be checked by instrumental measurements.

## References

- Bedford, T. (1936): *Indust. Hlth. Res. Bd. Rep.*, No. 76, London.  
 Hill, L., Flack, M., McIntosh, J., Rowlands, R. A., and Walker, H. B. (1913): "The Influence of the Atmosphere on our Health and Comfort in Confined and Crowded Spaces," *Smithsonian Miscellaneous Collections*, Vol. lx, No. 23, Publication 2170.  
 Ministry of Fuel and Power and Ministry of Works (1946): "District Heating as Applied to Small Housing Estates," London.  
 Yaglou, C. P., et al. (1936, 1937): *Heating, Piping and Air Conditioning*, 8, 64; 9, 447.

For convenient reference in practical use a recapitulation is given below of the conditions and standards which are at present accepted as satisfactory, and the instruments which may readily be used for determining whether or not such conditions are being maintained are indicated.

(1) Ventilation and heating should be controllable.

(2) Air temperature: 60–68° F. Dry Bulb: 65° F. being a good standard for the sick room and for general use. Measurement taken by whirling or swing hygrometer.\*

(3) Relative humidity: not greater than 70 per cent. which will be ensured if the Wet Bulb temperature of the air, as measured by the whirling hygrometer, is at least 7° F. lower than the Dry Bulb over the range 60–68° F. Tables for use with the whirling hygrometer, giving the actual relative humidity for the depression of the Wet Bulb in relation to the Dry Bulb are given in the publication referred to below.\* In this country the climatic conditions are such that unduly low humidities rarely occur; 30 per cent. is considered as the lower limit in the comfort zone for relative humidity in ordinary rooms.

In operating theatres in which the Dry Bulb temperature of the air may range from 70–85° F. the relative humidity should not be allowed to fall below 60 per cent. owing to the risk of static electrical discharges (e.g., from blankets) which may cause an explosion if anæsthetic vapour is present. Provided the depression of the Wet Bulb is not more than 9° F. the relative humidity will not fall below 60 per cent. It is most desirable that a recording hygrometer showing Dry and Wet Bulb temperatures should be installed in operating theatres.

(4) Temperature gradient: in rooms used for continuous occupation the Dry Bulb air temperature at foot level should not be more than 5° F. lower than at head level. Temperatures may be observed by thermometers suspended at 6 inches and 5 feet from floor level and left in position for at least 15 minutes.

(5) Radiant heat and cold: the surface temperature of walls, ceiling, and furnishings should not differ widely from the Dry Bulb air temperature. Useful but approximate measures of surface temperature may be taken by fixing the bulb of an ordinary thermometer to the surface by adhesive tape and applying a strip to the top of the stem to secure the instrument in position.

(6) Ventilation: a minimum supply of fresh air of 600 cubic feet per person per hour is at present accepted as adequate for ordinary rooms, although a much greater ventilation is desirable in hot weather, and in any situation where moist heat, objectionable odours or fumes may arise. The fresh air entering a room must be well distributed.

When mechanical ventilation is installed the ventilation may be calculated from the performance of the supply and extraction fans. In other cases an approximate measure of air change can be arrived at by estimating the concentration of CO<sub>2</sub> in the air of the room after prolonged occupation, or by determining the rate of decline in concentration of some tracer substance previously liberated in the room.

(7) Air movement: within the range of 60–68° F. Dry Bulb the air movement should be variable and range from 20–30 feet per minute. In winter time draughts under doors and down draughts from windows may cause chilling discomfort. Draughts may be detected and traced by the white fumes of titanium tetrachloride and the velocity measured by means of the kata thermometer and Dry Bulb temperature as the rate of cooling of the kata thermometer depends upon the temperature and local movement of the air.

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\* Instructions for the use of instruments and tables are given in *Medical Research Council War Memorandum No. 17, "Environmental Warmth and Its Measurement,"* by T. Bedford, H.M.S.O., 1946.

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# PAIN AND ITS PROBLEMS

## IX.—UROLOGICAL PAIN

By W. E. UNDERWOOD, O.B.E., F.R.C.S.

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"PAIN in any part when not associated with increase of temperature must be looked upon as caused by an exalted sensitiveness of the nerves of the part, and as a pain depending upon a cause situated remotely from a part where it is felt. I would ask you to regard them as resulting from some direct nervous communication passing between the part where the pains are expressed and the real and remotely situated cause of the pain. Stone is not the disease although it is the cause of the symptom. The patient does not complain of the stone but of the pain and irritation which the calculus produces within the bladder".

These features of urological pain were set out by the President of the Royal College of Surgeons of England, John Hilton, in a lecture given in 1860, on "The Therapeutic Influence of Rest and the Diagnostic Value of Pain". The absence of pain in urinary stone is described in the *Lancet* of April 5, 1879 in an article on Lithotomy by Dr. Cadge, who wrote:—

"The behaviour of the bladder towards a stone in it is most peculiar and puzzling. In one case it displays almost perfect indifference and even acts the part of host with an approach to hospitality and allows the guest to grow and stay until it reaches enormous proportions. In other cases no sooner does a stone enter at one portal than the conflict begins and goes on until it is turned out along the urethral passage at the other portal or the bladder is perpetually fretted, worried and inflamed until either the surgeon or death comes to end the dispute".

During the three-quarters of a century since these clinical observations were made, pain has remained a salient diagnostic feature of genito-urinary conditions; an accurate appreciation gives the clinician marked assistance in diagnosis and is amplified by modern complex investigations which are most valuable in accurate localization and assessment of the pathological process.

### PAIN PATHWAYS

The distribution of the sensory nerve fibres from the genito-urinary tract has been studied by experimental methods in addition to pure anatomical dissection. The exact pathways are not yet certainly known, but a large field of workers are interested in the problem, and by their efforts fresh knowledge is continually being brought to light. From a segmental point of view the viscera are supplied with sensory fibres passing with the sympathetic nerves according to the following table:—

Kidney and ureter .....	Thoracic 10, 11 and 12 Lumbar 1 and 2
Bladder .....	Thoracic 11 and 12 Lumbar 1 and 2
Prostate and vesicles .....	Thoracic 10 and 11
Testicle .....	Thoracic 10, 11 and 12

The kidneys, and especially the upper part of the ureter, have sensory fibres supplied from a wide network including the lumbar sympathetic chain, the aortic plexus, and the splanchnic nerves; these, together with motor fibres, pass along the renal pedicle around which they form intimate contact; a few fibres are so intimately buried in the outer coat of the renal artery that they can be dissected free only with difficulty.

The bladder also receives a sensory nerve supply through the nervi erigentes from the 2nd, 3rd and 4th sacral nerves, whilst the other sensory fibres from the bladder, prostate and seminal vesicles pass along the pre-sacral nerves (hypogastric plexus), as can be proven by stimulation of the proximal end of this nerve divided under local anæsthesia.

#### CLINICAL PICTURE

Broadly speaking, urological pain tends to follow the course of the urinary passages. The clinical feature of a patient having a calculus in a kidney with lumbar pain over the posterior renal angle is familiar: the stone being of the migratory type moves until passed at the external urinary meatus; *pari passu* with this travel the site of pain moves along in a lumbo-inguinal direction through the suprapubic region into the perineum, and finally along the line of the urethra.

Abnormalities in the genital tract may similarly show themselves as discomfort in the testicle travelling in the direction of the vas deferens, giving a sensation of pain deep above the pubic region or in the region of the perineum and rectum. Very occasionally patients refer their pain to remote regions of the body, but the degree of pain is rarely severe, whilst any error in diagnosis is easily eradicated by a careful examination.

Pain referred to an unusual part of the genito-urinary system is liable to be very confusing, especially when it is referred to the kidney opposite to that in which the pathological condition, such as a stone, is present. Some authorities deny this possibility but it can be accepted that it does exist although the incidence of the phenomenon is low. Severe renal pain is not infrequently felt on the opposite side, whilst compensatory hypertrophy of a kidney is undoubtedly on occasions associated with an aching discomfort, whether this hypertrophy follow a nephrectomy or a temporary cessation of secretion from the opposite kidney due to a stone impacted in the pelvi-ureteric junction. In the rare case, however, no changes are present, so that a true reno-renal reflex must be borne in mind. On the other hand, this explanation should never be lightly accepted unless both sides have been carefully examined to exclude either a coexistent bilateral condition or unexpected intercurrent disease on the opposite, apparently sound, side.

*Distribution.*—There may be described four main subdivisions of urological pain:—the loin or lumbar, the hypogastric and iliac fossa, the recto-perineal, and the urethral.

Discomfort of whatever degree in the testicle is self-evident and generally indicates local trouble, except in the so-called typical renal colic, in which

the lumbo-inguinal discomfort is predominant with the terminal radiation referred to the scrotal contents. The symptoms are not restricted to one of these subdivisions, in fact overlapping is the rule rather than the exception, but an appreciation of their prominence in one of these areas is a valuable point in diagnosis; it is therefore of interest to consider the clinical features in more detail.

#### PAIN OF RENAL ORIGIN

The posterior renal angle between the 12th rib and the lateral margin of the erector spinæ muscle is the starting point of renal pain; from this point, especially when severe, it spreads forwards to the anterior renal pain area which lies approximately two fingers' breadth below the tip of the 9th costal cartilage. Usually this pain radiates in a lumbo-inguinal direction along the anatomical line of the ureter to a point near the subcutaneous inguinal ring; when intense, it may pass into the scrotum being there associated with a retracted tender testicle, or the direction may be along the crural branch of the genito-crural nerve into the thigh: in the female the spread may be into the labium majus.

It is not uncommon for this distribution to be atypical, a feature which may lead to erroneous diagnosis. Pain is often confined to the posterior renal angle in a mild case, or it may be entirely localized to the anterior area extending downwards from this region to the level of the umbilicus, or lower. In not a few instances the whole abdomen may be painful, tender and even distended; in these cases a diagnosis of an acute abdominal condition, e.g., gall-bladder, appendicitis or even diverticulitis, may easily be considered on the pain distribution alone, although in these difficult cases there is usually some other urinary feature, especially lumbar tenderness or abnormality of the urine, which should give a clue for further consideration.

In those cases in which the symptoms are less dramatic, accurate localization of the exact point of maximum tenderness is of great importance; it may lead to the true diagnosis of an extrinsic condition, whilst definite confinement to the posterior renal angle may give support to persistence in investigations leading ultimately to an unsuspected renal lesion. There is an all too common tendency to attribute the loose description of "a pain in my kidneys, doctor" to a renal condition, whereas close questioning and detailed examination should differentiate (1) the "lower pain" running across the lumbo-sacral area due to skeletal causes; (2) in the female, gynaecological conditions; (3) the more medial site suggesting a fibromyositis of the erector spinæ group of muscles.

*Calculus* and other causes of obstruction to outflow of urine generally cause an acute pain with exacerbations, leaving, on subsidence, a dull ache in the sites described above—in other words, a true colic: the more persistent pains having other inflammatory associations as, for example, pyrexia, immediately suggest such conditions as pyelitis or other pyogenic infections of the kidney and perinephric tissues.

Although hæmaturia is generally present in *malignant growths of the*

*kidney*, pain of a special type, even unassociated with bleeding, may not infrequently be an early symptom; this may be caused by tension within the renal capsule or hæmorrhage into the growth; it has a peculiarly persistent nature unaffected by posture and is little relieved by drugs. Although this pain may sometimes be an early symptom it is usually of grave prognostic import, indicating a spread beyond the kidney, involvement of nerves and doubtful operability.

Milder forms of renal pain are present in all forms of renal pathology abnormally mobile kidney, or even in chronic nephritis, described by Legueu as "neuralgia of the kidney". Finally, there is that clear-cut group of cases in which definite attacks of renal colic occur without any demonstrable cause in the urinary tract; for this special group the operation of renal sympathectomy has been recommended.

#### PAIN OF URETERIC ORIGIN

Ureteric pain has three main aspects and consideration of any one of them may point to the diagnosis; this symptom may be due to ureteric discomfort proper, to kidney ache caused by back-pressure effects, or to the secondary effects on other organs.

The position of true ureteric pain is largely determined by the position of the lesion, commonly a stone. If it be near the upper end, symptoms are mainly renal with the clinical characters already described. Pain originating in the lower ureteric region is commonly more anterior, running along a line from a point just below the internal to the tip of the 9th rib, following the outer border of the rectus muscle to the external abdominal ring. There is frequently an accompanying ache in the posterior angle often aggravated by increased diuresis; suggestion that it is due to early dilatation of the renal pelvis is therefore acceptable as an indication for early surgical intervention. It is interesting to note how a spiculated oxalate stone in the ureter when stationary may often be silent provided that urine can flow unobstructed down the ureter. Braasch and Moore analysed 230 cases of calculus in the ureter: 67 per cent. had pain referred to the renal angle, 15 per cent. the symptoms were in the upper quadrant of the abdomen, 9 per cent. in the lower quadrant, and in 2 per cent. the calculus was "silent". When ureteric pain is due to a calculus in the lower end of the ureter (a not uncommon site) symptoms are frequently referred to other organs, notably the bladder, seminal vesicles or rectum.

Pain referred to the rectum accentuated by defæcation is by no means constant and is indeed only noted occasionally. On the other hand, irritation of the seminal vesicle, which lies in close relation to the lower end of the ureter, is an important feature, giving rise to symptoms that may mislead unless the possibility of ureteric calculus is borne in mind; these symptoms are painful nocturnal emissions, also pain on ejaculation during coitus which may be accompanied by hæmatospermia with pain related to the testicle or in the line of the vas deferens.

On the other hand, symptoms are frequently referred to the bladder, but only when the stone is impacted in the intramural portion of the ureter; they include increased frequency of micturition, and especially pain at the end of the act of micturition related to the tip of the penis or, in the female, the external urinary meatus. Jeanbrau found such pain prominent in 45 per cent. of cases in which the ureteric calculus had been removed by the transvesical route.

#### THE LOWER URINARY TRACT

As in other viscera, the vesical bladder is usually insensitive to ordinary stimuli, although some areas of the mucous membrane are sensitive to tactile and painful stimuli; the region of the trigone and internal urinary meatus fall into this second group, pain being referred to the under-surface of the external urinary meatus or sometimes to the anus through the medium of the second and third sacral nerves.

Receptors in the bladder wall are stimulated by changes in bladder volume, others by rise of intravesical pressure. The impulses conducted through the hypogastric nerves are mainly those of pain caused by distension, and the receptors of these impulses adapt slowly, a feature that helps to explain the suprapubic uneasiness or even pain which follows rapid distension of the bladder, although it may be distended to a very much larger capacity without undue discomfort, provided the process be gradual.

In vesical conditions having pain as a symptom, the pain varies in site and type not so much with the nature of the lesion as with its anatomical situation; for example, a cystitis diffused over the whole bladder is characterized by a dull suprapubic pain due to increased intravesical pressure accentuated by spasm of inflamed musculature, whilst the intense, lancinating pain referred to the urethral tip originates from the tactile and pain appreciation of the trigonal region.

#### THE GENITAL TRACT

It is often difficult to dissociate painful sensations of the genital tract from those of the lower urinary tract, but since the causative pathological condition so frequently affects both, this is not surprising; in the region including the posterior urethra, prostate and seminal vesicles, for example, a prostatitis-vesiculitis is frequently associated with cysto-urethritis. In order to localize the disease to any of these organs it is usually necessary to employ specialized methods of investigation, but pain alone is responsible for drawing the attention of the patient to the anatomical area and the probable need for further examination.

The sensations may be divided into two groups, those referred to a cysto-urethral origin and the remainder arising in the prostate and seminal vesicles. Although both these origins of pain have already been considered under secondary irritation due to low ureteric calculus, it is interesting to note that there are certain variations which appear when the primary condition is in one of these organs.

The *cysto-urethral group* consists of an increasingly frequent and urgent desire to pass urine, with scalding pain during the act referred to the tip of the penis; the remaining painful symptoms are vague, and although each one may be indefinite, considered together they form a syndrome which may easily lead to the true diagnosis. They include a sense of weight in the perineum and rectum often accentuated by defæcation, with a similar heavy feeling in the sacral and sacro-iliac regions, sometimes even including the thighs and groins.

In the *pure urethral type of pain* it is interesting to note that the symptoms occasionally appear to move backwards when the actual lesion may have progressed forwards. This can be observed in the case of a stone lodged in the posterior urethra and internal urinary meatus when the salient symptoms will be referred to the external urethral orifice, but as the stone moves along the anterior urethra it will give a site of pain that coincides with the anatomical position of the calculus. For this same anatomical reason it is usually possible to orientate lesions in the anterior urethra, such as inflamed Littre's or Cowper's glands, upon the patient's subjective symptoms, even though exact and confirmatory localization by urethroscopy may not always be so simple.

#### TREATMENT

In the treatment of urological pain *per se* it should always be borne in mind that the symptom is essentially a guide to a lesion. Empirical relief of the pain should therefore be carried out only when a diagnosis has been made, even though in the acute phase this may be provisional only; this precaution is especially wise in the case of renal pain for which sympathectomy has been mentioned earlier.

Renal pain should always receive meticulous investigation; in those rare instances when no organic cause is demonstrated the pathological condition is most probably a neuro-muscular dysfunction, to be seen in its later phase as the idiopathic or, as it is sometimes known, "congenital" type of hydro-nephrosis. In treating such cases sympathetic denervation may indeed be indicated, but its aim should be restoration of the neuro-muscular emptying of the renal pelvis to a state as near normal as possible, rather than mere section of afferent pain-carrying fibres.

Finally, there are indications for section of pain fibres purely as a means of relieving distress in inoperable conditions no longer responding to available therapeutic measures: presacral resection of the hypogastric nerves for relief of intractable bladder pain due to vesical carcinoma or, in extremely severe cases, intrathecal injection of alcohol or chordotomy, are examples of this procedure which are in every way justifiable and indeed indicated.

In conclusion, the words of John Hilton come back to mind:—

"Every pain has its distinct and frequent signification if we will but carefully search for it; pain the monitor is a starting point for contemplation which should ever be present to the mind of the surgeon in his reference to treatment".

# REVISION CORNER

## ECTOPIC GESTATION

In the vast majority of cases the primary implantation is in the tube, but occasionally it may be in the ovary or elsewhere in the abdomen. The site of implantation in the tube is of great importance so far as the subsequent history of the development of the ovum and the symptoms produced in the woman are concerned. The three important parts of the tube in which the ovum may embed itself are (1) the ampulla (35 per cent.), (2) the isthmus (60 per cent.), and (3) the interstitial or intramural part (5 per cent.).

The most common causes are probably previous tubal inflammation or tubal spasm at the time of the passage of the fertilized ovum, leading to delay until the ovum is too large to pass into the uterus.

### LIFE HISTORY OF THE ECTOPIC OVUM

This depends largely upon the embedding site, as the smaller the room for expansion, the earlier will be its almost inevitable death. If the site is primarily ovarian or abdominal, there is room for expansion and the formation of a false sac, and the ovum may continue to develop to term. The same applies to those primary tubal implantations in which tubal rupture or fimbrial extrusion takes place with sufficient blood supply to keep the ovum alive. In most cases, however, the lack of room and the constant erosion of tubal blood vessels by the chorionic villi (which have no true decidua to check their activity) lead to either a gradual death of the ovum as succeeding layers of clot are deposited on it, or its sudden death as the result of a tubal rupture or the erosion of a large blood vessel in the tube wall.

### SYMPTOMS

These are of two types:—

(1) *The dramatic* and fortunately less common: this is the case in which tubal rupture or erosion of a large vessel has taken place. The woman may not even have missed a period, when the gestation is in the narrower parts of the tube (sites 2 and 3). She drops down dead, or is found collapsed and almost pulseless with all the signs and symptoms of internal hæmorrhage.

(2) *The insidious* and more usual. Here the woman will have missed one or more periods, she will think she is pregnant, but she will not feel well, and will have vague colicky pains in the lower abdomen from time to time, and intermittent losses of dark blood from the vagina. She may also have occasional feelings of faintness. In these cases there is more room for expansion, as the ovum is in the ampulla, and the symptoms are due to vigorous contractions of the tube, a slow leak of blood into the pouch of Douglas, and partial separation of the uterine decidua as the ovum dies. In many of these cases, death of the ovum occurs with or without its extrusion through the fimbrial end of the tube, followed by the expulsion of the decidual cast intact or fragmented from the uterus. Undoubtedly a number of such cases are regarded as inevitable or threatened miscarriages that have subsequently become complete.

### DIAGNOSIS

Diagnosis is easy in the dramatic cases, but difficult in the insidious. Although the exact cause of the symptoms produced in the sudden tubal rupture or severe hæmorrhage may not always be suspected, yet the fact that there is intraperitoneal bleeding taking place makes the question of treatment simple and the life of the woman is most probably saved. In the cases which present the symptoms of an acute abdominal condition, without the picture of severe internal bleeding, the diagnosis may also be in doubt, and this is proved by the large number of patients

sent into hospital with the diagnosis of an acute appendix or a pyosalpinx when the actual condition is an ectopic gestation. Fortunately there should be only one treatment in these cases, and the immediate laparotomy again saves the woman's life in spite of the wrong diagnosis.

It is in the insidious variety that the woman is exposed to the greater danger, especially when the symptoms of an early pregnancy with a threatened miscarriage are simulated. Here there may be some uterine enlargement, a slightly patulous external os, and possibly nothing else definite. One is tempted to temporize and treat the supposed threatened miscarriage. In other cases the uterus may be retroposed and lying on a pelvic hæmatocele and the diagnosis made of a retroverted gravid uterus with a threatened miscarriage. Again one is tempted to wait and see. On the other hand, when there has been a slow leak into the pouch of Douglas with the formation of a hæmatocele and consequent peritoneal irritation, the diagnosis of a subacute salpingitis is made, and temporization resorted to with conservative treatment. In all these cases the patient is exposed to the constant risk of her symptoms suddenly swinging to the dramatic when rupture or hæmorrhage takes place, and she may then be in the position when an emergency operation is either impossible or too late.

The most common mistake to make in the other direction, i.e., to diagnose an ectopic gestation when in fact the pregnancy is intra-uterine, is when a patient in an early pregnancy threatens to miscarry and has some pain in one or other lateral fornix. On examination, the uterus is found to be enlarged but an elastic, tense swelling is felt in the fornix where the pain has been present. This is thought to be a tubal pregnancy, whereas it is really a lutein cyst so commonly associated with miscarriages.

#### TREATMENT

In spite of what has been said about the insidious cases so often ending in ovular death, with or without tubal mole formation or tubal abortion, it is never justifiable to wait to see whether this has taken or is taking, place. Even though the presence of an ectopic pregnancy is only suspected, laparotomy should be the sole treatment, with a transfusion started as the abdomen is opened in the cases in which the picture is primarily one of hæmorrhage. In my opinion, the affected tube should always be removed, and the ovary conserved whenever possible. The fact that the tube has proved a bottle-neck for an ovum once should condemn it for good, no matter how healthy it may appear.

AUBREY GOODWIN, O.B.E., M.D., F.R.C.S.

#### WEANING

THE term "weaning" can be used in more than one sense. The dictionary definition of the word "wean" is "to accustom to nourishment other than mothers' milk", and so, an article on weaning could either deal with substitutes for breast milk, in cases in which the breast milk had failed, or with methods of *adding* "nourishment other than mothers' milk" to the dietary, assuming that the infant was healthy, and the mother's milk supply adequate. As space is limited, it is proposed to deal only with the healthy baby who is being successfully breast fed.

#### THE INTRODUCTION OF SOLIDS

Some time in the *fifth month*, the infant will be ready to take solid food from a spoon. Sieved vegetables should be offered before the 2 p.m. feed, the vegetables of choice being spinach and carrots, although tomatoes, and also any leafy vegetables, can be given. The vegetables should be cooked rapidly in a minimum of boiling water, and should then be sieved, and the resultant product, which should be of the consistency of jam, should be given from the spoon. The mother is instructed to



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These are of two types:—

(1) *The dramatic* and fortunately less common: this is the case in which tubal rupture or erosion of a large vessel has taken place. The woman may not even have missed a period, when the gestation is in the narrower parts of the tube (sites 2 and 3). She drops down dead, or is found collapsed and almost pulseless with all the signs and symptoms of internal hæmorrhage.

(2) *The insidious* and more usual. Here the woman will have missed one or more periods, she will think she is pregnant, but she will not feel well, and will have vague colicky pains in the lower abdomen from time to time, and intermittent losses of dark blood from the vagina. She may also have occasional feelings of faintness. In these cases there is more room for expansion, as the ovum is in the ampulla, and the symptoms are due to vigorous contractions of the tube, a slow leak of blood into the pouch of Douglas, and partial separation of the uterine decidua as the ovum dies. In many of these cases, death of the ovum occurs with or without its extrusion through the fimbrial end of the tube, followed by the expulsion of the decidual cast intact or fragmented from the uterus. Undoubtedly a number of such cases are regarded as inevitable or threatened miscarriages that have subsequently become complete.

### DIAGNOSIS

Diagnosis is easy in the dramatic cases, but difficult in the insidious. Although the exact cause of the symptoms produced in the sudden tubal rupture or severe hæmorrhage may not always be suspected, yet the fact that there is intraperitoneal bleeding taking place makes the question of treatment simple and the life of the woman is most probably saved. In the cases which present the symptoms of an acute abdominal condition, without the picture of severe internal bleeding, the diagnosis may also be in doubt, and this is proved by the large number of patients

at 4 p.m. or at 4.30 p.m., and then a milky drink at about 6 p.m., on going to bed. This is not a good idea; if the child wants something at 4 p.m., he can have a small drink of juice. He should then have a good tea-supper at 5.15 p.m. or thereabouts. He can have sandwiches of marmite, parsley, honey, cheese, or jelly (seedless jam), with milk (boiled) to drink, or cereal if he prefers it. He can have fruit purée, vegetable purée, with rusks or crusts to eat. If he has not had a meal at 4 p.m., he will probably eat enough at this meal to last him all night.

*Cod-liver oil* is best given after the meal at this age; if it is disliked it should be replaced by a good substitute in adequate dosage. Halibut-liver oil, if given in doses usually recommended, is not suitable as an anti-rachitic agent, and the malt preparations are most inadequate as substitutes for cod-liver oil. It is important when instructing a mother that she should be told *why* she should give certain foods; she cannot be expected to know all the finer points about the vitamins, but she can, and should, know which foods contain protein and why protein is important.

The above scheme has been worked out for the breast-fed infant; it can be used equally well for the bottle-fed baby.

CECILE ASHER, M.D., M.R.C.P., D.C.H.

## THE PROBLEM OF TEETHING

At one time many symptoms occurring in infancy were attributed to teething. Later the opposite view prevailed and teething was said to produce nothing but teeth. This extreme view emphasizes the question that should always be asked before ascribing a condition to teething—"What have I missed?"

### DIFFERENTIAL DIAGNOSIS

The difficulties arise during the first dentition—from 6 to 30 months—and most of the problems occur before 18 months. The following diseases may be overlooked:—

*Otitis media and throat infections.*—Children even with severe tonsillitis rarely complain of sore throat, and only the presence of anorexia, malaise, irritability and a sharp rise of temperature, often with vomiting, prompt examination of the throat. In infancy, nasopharyngitis may occur without rhinorrhœa. The short Eustachian tube is only too likely to transmit infection to the middle ear, but, again, local symptoms, such as pulling the ear, may be absent. Besides fever and irritability, meningism is not uncommon and otitis is a frequent parenteral cause of diarrhœa. Otoscopic examination is essential when indefinite symptoms are present. The earliest signs are loss of the light reflex and redness of the adjacent external auditory canal.

*Meningitis.*—Acute septic meningitis with its sudden onset and early marked meningeal signs, particularly when the fontanelle bulges, is rarely overlooked, although the influenzal type may be insidious. Tuberculous meningitis is often most difficult to diagnose in the early stage. Apparently causeless vomiting is common, as is constipation with a retracted abdomen. Personality change may be the first sign and periods of drowsiness are frequent. The stage of meningeal irritation may not appear for a week or two. Lumbar puncture must be done on suspicion, for changes are present early, namely, up to 300 lymphocytes per c. mm. (polymorphs may predominate in acute cases), a rise in protein and a fall in chloride below 0.7 per cent. The tubercle bacillus may be isolated from the web which forms on standing.

*Pneumonia.*—Lobar pneumonia is now known to occur quite frequently under the age of two. The disease is often heralded by vomiting and a sharp rise of temperature. Cough may be negligible, but rapid respirations with inverted rhythm should arouse suspicions, especially as physical signs may be limited to a tiny area of crepitations late in the course. Broncho-pneumonia tends to be more insidious but cough and bronchitic signs are early, and the child is more ill, with an irregular temperature.

give one teaspoonful the first day, and to increase the amount gradually, day by day, according to the infant's inclination. At about the same time, a small amount of cereal (fine semolina, or pre-cooked cereal), made with milk diluted with an equal quantity of water, is offered before the 10 a.m. feed. This is gradually increased up to about two tablespoonsful daily.

The advantage of adding solids early is that it leaves plenty of time for the infant to get used to new textures and tastes, before he begins to need larger amounts to satisfy his nutritional needs; he is, in fact, being educated to *like* new foods and to use a spoon.

*At six months*, it is convenient to add to his midday vegetables, cheese (grated), butter, or meat gravy. Cheese should be given in small amounts to start with (half a teaspoonful); it is the easiest protein for him to learn and does not really require much learning as it is familiar to him as the protein of milk. "Meat gravy" refers to meat juice from the weekly roast joint (if there is one). This first course of vegetables is followed by fruit or fruit juice (apple, prune, apricot, rosehip syrup, blackcurrant purée) with junket (made with boiled milk) milk jelly, or semolina. No breast milk is given at this feed, but a small drink of milk and water can be given from a cup if really wanted. The cereal given at 10 a.m. can now be varied; groats can be used, in addition to cereals already given. A rusk, or tough square crust from the outside of a brown loaf can be given before the 6 p.m. feed.

*At seven months*, many infants will have voluntarily dropped one feed (usually the 10 p.m. feed). If this is so, it is often convenient to give fruit juice if the infant wakes early, and to give the first feed of cereal followed by breast milk at 8 a.m. The next meal will then be taken at 12 noon, the next at 4 p.m., and the last any time between 8 p.m. and 10 p.m. *Egg-yolk* is introduced cautiously into the midday feed, preferably mixed with the sieved vegetables. Only half a teaspoonful is given on the first occasion.

*At eight months*, fish is introduced (short fibred fish such as plaice is best), and it is important that it should be well mixed with white sauce or with mashed potato (which is also introduced for the first time at this age) as its texture is quite a new one to him, and he may reject it for its strangeness rather than for its taste.

#### DROPPING THE BREAST FEEDS

The child is now having three breast feeds a day; these can be dropped, one by one. First the 4 p.m. breast feed can be omitted, and milk and water from a cup given instead. Then, the 8 a.m. feed can be dropped, and milk and water, cereal, crust or toast, given. Finally, the 10 p.m. feed can be left out entirely, and the last feed of the day given between 5 p.m. and 6 p.m. The mother has no trouble with her breasts, if she "weans" in this leisurely way; there is, of course, no urgency for the process to be completed at nine months; sometimes the last feed is continued well into the eleventh month (it is probably no more than a "token" feed by this time).

#### MEALS

By the age of nine months, if the child has followed the above régime, he has been taught to space his meals well, to drink well from a cup, and to enjoy and digest foods containing the proteins, minerals and vitamins. He should now be able to have three meals a day, with the family.

*The first meal* is best given about eight o'clock, and consists of milk and water from a cup, toast or rusk spread with butter, bacon fat, margarine or marmite, cereal and fruit juice.

*The second meal*, his dinner, given between 12 noon and one o'clock, consists of vegetables (mashed not sieved), with egg or fish or cheese, or liver or tripe, followed by junket, custard, milk jelly, semolina, with fruit or fruit juice.

*The last meal* is best given at about 5.15 p.m. There is a tendency to give a meal

at 4 p.m. or at 4.30 p.m., and then a milky drink at about 6 p.m., on going to bed. This is not a good idea; if the child wants something at 4 p.m., he can have a small drink of juice. He should then have a good tea-supper at 5.15 p.m. or thereabouts. He can have sandwiches of marmite, parsley, honey, cheese, or jelly (seedless jam), with milk (boiled) to drink, or cereal if he prefers it. He can have fruit purée, vegetable purée, with rusks or crusts to eat. If he has not had a meal at 4 p.m., he will probably eat enough at this meal to last him all night.

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*Pyelitis*.—Local symptoms are not to be expected and the onset is sudden with vomiting or convulsions and a temperature up to  $103^{\circ}\text{F.}$  ( $39.4^{\circ}\text{C.}$ ). Loose stools are common and a high respiration rate is somewhat characteristic. A swinging temperature, pallor, anorexia and loss of weight follow. Diagnosis can be made only by the demonstration of pus cells in the urine, and, as *B. coli* is the causative organism in most cases, a sterile specimen is not required; therefore a specimen from a female infant may be obtained by sitting her in a hollow fold of a mackintosh sheet.

*Pink disease*.—This not uncommon disease begins gradually with coryza. Later come misery, restlessness and insomnia. Photophobia is usual and the sufferers often lie with their faces buried in the pillows. Anorexia, wasting, particularly of the thigh adductors, and hypotonia are characteristic. The hands and feet become swollen, red and cold. Excessive sweating with an accompanying rash develops and, in severe cases, loss of teeth and nails, and excoriations from constant rubbing from the irritation occur. There is no laboratory aid to diagnosis and incomplete forms often pass unrecognized.

*Gastro-enteritis*.—No case of "D and V" must be attributed to teething until the classical three groups have been excluded:—

(1) Infective: due to the salmonella group, dysentery, and the like. A sudden onset, early toxicity and blood and mucus in the stools help towards its recognition.

(2) Dietetic: frequent causes are overfeeding in hot weather and an incorrectly balanced diet at any time.

(3) Parenteral: here the diarrhoea is secondary to an infection, usually respiratory (including otitis media) or pyelitis. No relief can be expected until the associated infection is cured.

#### GENERAL SYMPTOMS AND SIGNS

When such diseases have been excluded certain symptoms are often encountered in the teething infant. These have been explained (Schwartzman; *Arch. Ped.*, 1942, 59, 188) by the fact that the erupting tooth presses through the resistant gum, causing some trauma which may be followed by tissue destruction. Circulatory stasis by compression of the gum is added, so that tissue resistance to either extraneous organisms or normal buccal pathogens is lowered. The resulting inflammation may remain localized or spread to adjacent mucosa, when salivation increases with the risk of infection being carried back to the pharynx and thence to the nose and ears. For long, increased nervous irritability has been associated with teething and this is probably due to stimulation of the trigeminal nerve endings.

The most common symptoms are irritability and poor sleep, the child frequently waking with a cry. Usually these last for only a few days and subside suddenly as the tooth comes through. Indeed the sudden cessation of symptoms as a tooth is cut is the proof that the condition is due to teething. In addition, feeds may be refused, and should anorexia be prolonged weight will not be gained and the child becomes pale. This is due to pain and the irritation also leads to cramming the fingers in the mouth and biting on to hard objects. Dribbling is frequent and may lead to dermatitis of the chin—to be differentiated from infantile eczema which has no relation to teething. Fever up to  $102^{\circ}\text{F.}$  ( $38.9^{\circ}\text{C.}$ ) lasting for a few days, or a low evening pyrexia for a longer period, may occur, but as fever appears to accelerate eruption the higher grades are usually short-lived. Isolated vomiting for one to two days is occasionally seen. Rarely, nervous disease is simulated, for, besides head rolling and banging, photophobia and head retraction with Kernig's sign may occur, and convulsions are liable to appear at this time of life for which no other cause can be found. These convulsions consist of twitchings with the eyes turned upwards or squinting, usually without loss of consciousness, which may last up to half an hour. Parents are emphatic that bronchitis and diarrhoea are associated with dentition and such conditions may recur as successive teeth are cut. This may be due to spread of

infection, as mentioned above, or to a lowered state of resistance. Rickets increases the child's irritability and so is likely to accentuate all symptoms.

#### TREATMENT

A teaspoonful dose of castor oil is often of value, and for the irritability chloral, 1 to 2 grains (0.065 to 0.13 gm.), repeated up to thrice daily, or antipyrine, 1 grain (0.065 gm.), are useful sedatives. Formerly lancing the gums was often practised, but this is rarely necessary and carries the risk of infection; biting on a bone ring is usually effective. Feeding may cause temporary difficulties and feeding with a spoon, with a sedative before each meal, is often required.

H. EVERLEY JONES, O.B.E., M.B., M.R.C.P.

## NOTES AND QUERIES

### *Mepacrine and Jaundice*

QUERY.—Has mepacrine any toxic effect on the liver? Recently two of my patients developed jaundice soon after administration of the drug. One patient was a woman, aged thirty-three, slightly anæmic and under treatment for chronic recurrent urinary infection; she received 15 tablets in the course of five days. The other patient was an old lady of seventy-eight, who received 9 tablets of mepacrine. Could the icterus in these two cases have been due to a toxic effect of mepacrine on the liver, or could it be due only to coincidence? While attached to a Military Hospital I have administered 69 tablets of mepacrine to each patient in the course of seven weeks, 27 tablets being given during the first week of treatment. Some of these patients were very anæmic but no toxic reactions, except occasional psychoses, were met with.

REPLY.—It is difficult to answer dogmatically that mepacrine has no toxic effect on the liver but mass experience in India and South East Asia Commands during the war did not show any convincing clinical evidence that mepacrine damaged the liver or caused jaundice when used in therapeutic doses. Hundreds of thousands of men took a tablet a day for months on end as a means of malaria suppression, and tens of thousands of men received 3 gm. during a week in the course of treatment, and in both instances without any evident hepatic ill-effects. Arguing from experience in India and South East Asia Commands, it would seem probable, though not certain, that the jaundice which developed in the two patients mentioned in the query was due not to mepacrine but to other causes.

H. L. MARRIOTT, M.D., F.R.C.P.

### *Subfertile Semen and Miscarriage*

QUERY.—With reference to the article in the April issue by Miss Margaret Moore White, is there any evidence that subfertility in the hus-

band may render the wife prone to miscarriage? The question has arisen in connexion with a patient whose wife after two years' sterility has miscarried twice. Investigation of the husband's semen shows reduced density, poor motility, and high incidence of abnormal head forms. If this impaired fertility on the part of the husband is conducive to miscarriage in the wife, what form of treatment promises the best results?

REPLY.—There is as yet, so far as I know, no authenticated evidence to show that miscarriages are more liable to occur when conception follows impregnation with semen of poor quality. Individual observations and those of colleagues give evidence that it does, and work is in hand that will, I think, confirm the statement. It is advisable to warn the woman who becomes pregnant from fertilization with semen of poor quality that there is a greater risk of miscarriage, and instruct her in all advisable precautions. In addition, injections of 400 to 500 units of chorionic hormone should be given twice a week during the first few weeks of pregnancy, decreasing to once a week after the end of the third month of pregnancy. Vitamin E can also be given.

MARGARET MOORE WHITE, M.D.,  
F.R.C.S., M.R.C.O.G.

### *Paralysis Agitans and Heredity*

QUERY.—There exists an hereditary form of paralysis agitans. Can you give me any information as to the mode of transmission? Is it dominant, so that cases may occur in each generation? My patient developed the disease, so far limited mostly to the right arm, in her fifty-ninth year. Now her son, aged thirty-nine, has consulted me complaining that he recently noticed an occasional pronation-supination tremor in his right hand. There is no history of any previous cases in the family but the parents of the second patient were third cousins; no

history of encephalitis, but the young man suffered from mild poliomyelitis. Is there any treatment advocated recently besides hyoscynamine? Are operations on the corpus striatum and lateral column still carried out?

REPLY.—Your question is difficult to answer fully, for the alleged cases of hereditary paralysis agitans are very few, and an attempt to find the mode of transmission would necessitate a difficult search of neurological literature. On the other hand it is very improbable that your patient's son is suffering from paralysis agitans at the age of thirty-nine. A rhythmical tremor of the type described at that age is more likely to be due to a familiar tremor which may become apparent at this age and become worse. This relatively benign condition is sometimes called senile tremor, and never makes the patient rigid and helpless as does paralysis agitans. Indeed in the later decades of life it may become less troublesome. Senile tremor is often wrongly thought to be paralysis agitans, but there is no muscular rigidity and with the wrist supported the tremor usually ceases. Some excellent surgeons suffer from this type of tremor! There is no new treatment for paralysis agitans, and brain operations are not attempted. As mental relaxation reduces the tremor a regular sedative, such as phenobarbitone, 1 grain (65 mgm.) in the morning and  $\frac{1}{2}$  grain (32 mgm.) after lunch, may help.

W. RITCHIE RUSSELL, M.D., F.R.C.P.

### *The Late Treatment of Poliomyelitis*

QUERY.—I should be grateful for advice on the later treatment of acute anterior poliomyelitis. I have several cases which have been treated with faradism, exercises, massage, and baths for periods varying from sixteen to thirty months after the attack. What are the criteria for the cessation of all treatment?

REPLY.—If a patient with poliomyelitis is treated continuously from the time of onset of the disease, it will be found that most of the useful recovery occurs within the first nine months and none to speak of after eighteen months. The only sure guide is regular charting of muscle power at intervals of not more than three months. When the charts show that no further improvement is taking place the time has come for resumption of activity with such supportive apparatus as may be necessary. The prescription of such apparatus is a skilled procedure: the best guide to it is Boppe's "Paralytic Infantile" or Lewin's book on the same subject. Reconstructive surgery is rarely undertaken within less than two years after the acute attack: its chief value is in enabling the patient to discard supportive apparatus, or in stabilizing

a joint, such as the shoulder or wrist, that cannot conveniently be controlled by an external appliance.

PROFESSOR H. J. SEDDON, D.M., F.R.C.S.

### *The Termination of Artificial Pneumothorax?*

QUERY.—What is the best method of terminating an artificial pneumothorax? Is it better to "tail" it off by longer spacing of refills, or to end it suddenly by complete cessation of refills?

REPLY.—Assuming the pneumothorax has been used for the treatment of tuberculosis my own preference is undoubtedly for the gradual method of termination, which can be achieved either by increasing the spacing between the refills or by reducing the amount of air given, or by a combination of the two. The process of gradual expansion gives time for the detection before it is too late of a reactivation of the disease, or a reopening of the cavity, should either occur. The points to which particular attention should be directed during this period are:—(1) General or respiratory symptoms; (2) the weight chart; (3) sputum, which if present should be regularly tested for tubercle bacilli; (4) erythrocyte sedimentation rate; and (5) most important of all, frequent inspection of the originally affected area by serial comparable X-ray films of the chest.

Two further points need to be considered:—first, the displacement of the mediastinum towards the side of the pneumothorax which may occur if the lung, handicapped by scarring or pleural thickening, is unable to fill the space by its own efforts. If the shift threatens to become excessive it can be counteracted to some extent by a phrenic nerve operation on the same side. Secondly, the enhanced liability to fluid formation which appears to result from a too highly negative intrapleural pressure. If moderate in amount the fluid causes either little or no inconvenience, is often only transitory, and may be disregarded. The contingency can be met by a small refill of air. Some authorities allow the lung to rise almost to the surface and then maintain a shallow "mantle" pneumothorax for a short period before finally abandoning the treatment. As a means of "testing out" the lung in the position of almost full re-inflation, yet keeping the pneumothorax in being, this method has much to commend it, but requires careful management even under fluoroscopic control.

N. LLOYD RUSBY, D.M., M.R.C.P.

### *Recurrent Myalgia*

QUERY.—I have a problem relating to myalgia in a patient who suffers extreme pain from time

to time from this condition. He is relieved at once by novocaine infiltration of the node, but the attacks, which recur at least once or twice a month, have shown no signs of lessening although they are becoming less severe. Could you enlighten me as to etiology, prognosis and "cure".

REPLY.—Assuming that the pain is organic rather than psychosomatic in origin, there are two main theories as to causation:—(1) that it is due to swelling, congestion or herniation of a fatty lobule (Copeman, 1944), or (2) that it is due to localized muscle spasm initiated by accumulation of toxins, by some reflex irritation, or by impaired circulation, the result of hyper-irritability of the blood vessels (Elliott, 1944). The prognosis must obviously depend upon the causation, but if the "node" is localized the chance of cure is good.

It is not clear whether, in the case under discussion, the pain always recurs at the same site. If this be so, careful search should be made for a reflex source of origin from any organ of the same segmental nerve supply. If none is discovered and it is certain that the point selected is the site of origin of the pain, then injection is indicated. Not infrequently, a painful and slightly tender area may be the result of irritation from a smaller less painful site, tender on deep palpation only and situated nearer the

vertebral column than the area where the pain is felt. It is this latter smaller "node" which requires treatment. Injection at various depths and in several directions from the same point of puncture should be followed by deep friction and then mobilization. The pain usually disappears at once, to return in a few hours and then gradually fade away. The part affected should be protected from draughts, and regular mobilizing exercises together with skin friction should be carried out each morning to prevent recurrence. Alternately, the site may be explored under a local anæsthetic and any fatty hernia removed. If the site of recurrence of the pain varies, then likely foci of sepsis should be investigated and a course of massage and hydrotherapy, including contrast sprays to re-educate the response of the blood vessels to heat and cold, is indicated. Much, however, can be done in the way of home treatment by means of a hot bath, a cool sponge, and then a sharp rub down with a rough towel. During attacks, an aspirin, phenacetin, caffeine mixture in the morning, and aspirin, phenacetin and luminal at night are helpful.

G. D. KERSLEY, M.D., F.R.C.P.

#### References

- Copeman, W. S. C., and Ackerman, W. L. (1944): *Quart. J. Med.*, 13, 37.  
Elliott, F. A. (1944): *Lancet*, i, 47.

## PRACTICAL NOTES

### *Ointment for the Relief of Itching*

THE use of a 2 per cent. tripeleannamine (pyri-benzamine) hydrochloride ointment in water-soluble or anhydrous base for the relief of itching in a series of cases of flexural eczema, pruritus ani, and other forms of dermatitis is recorded by S. M. Feinberg and T. B. Bernstein (*Journal of the American Medical Association*, July 5, 1947, 134, 874). The first group comprised thirty-three cases of flexural eczema, thirteen adults and ten children under the age of ten years, in whom cutaneous reactions and observation indicated a relationship between the eczema and specific allergy. Most of these cases were severe. The patients were instructed to apply the ointment as often as needed, and in twenty-four instances consistent relief from itching was reported. In some cases pyri-benzamine or other antihistaminic drugs taken orally increased the benefit obtained from the local application of the ointment. A number of these patients stated that the ointment gave relief superior to any other local application, including local anæsthetics. In a few cases, and par-

ticularly when there was acute inflammation, the ointment proved irritating; a stinging sensation a few moments after application, however, is no contraindication to its use. Of nine patients with pruritus ani, eight obtained symptomatic relief, and in one patient there was noticeable diminution of the acuteness of inflammation. In two cases of contact dermatitis of the eyelids, and in three of dermatitis of the arms and legs of unknown origin, improvement in the itching was obtained, and also in one case of urticaria; in four other cases of dermatitis no improvement was noted. The choice of the water-soluble or anhydrous base depends upon the individual case; in most instances water-soluble base is preferable because the action is quicker and more pronounced, but when a greasy covering is desirable the anhydrous base may be preferable. It is stressed that the local application of the pyri-benzamine ointment should in no way supplant allergic or internal therapy, nor other local therapy, such as lotions of solution of aluminium acetate, tar or naphthalane; the ointment is primarily for the relief of the itching.



### *Pyribenzamine in the Treatment of Hay Fever*

THE results obtained in the treatment of 82 cases of ragweed hay fever with pyribenzamine alone and in conjunction with ragweed desensitization are recorded by H. Leibowitz, I. Maxwell Kurtz and E. Schwartz (*New York State Journal of Medicine*, May 1, 1947, 47, 989). Pyribenzamine [diaminobenzopyridyl HCl ( $n'$ -pyridyl- $n'$ -benzyl- $n$ -dimethylethylenc-diamine hydrochloride)] was given orally in dosage of 50 mgm. twice daily, after breakfast and before bedtime. The patients were divided into three groups, group 1 receiving pyribenzamine alone, group 2 pyribenzamine and ragweed desensitization, and group 3 ragweed desensitization alone. In group 1, symptomatic relief was obtained in 9 out of 21 cases (43 per cent.); in group 2, in which the best results were obtained, 35 out of 47 cases were relieved (74 per cent.). The top dosage of ragweed was reached by mid-August and then reduced for maintenance throughout the season, pyribenzamine being added at the onset of the season and administered twice daily. In group 3 relief was obtained in 10 out of 18 cases (55 per cent.). Side-reactions occurred in 36 per cent. of the patients treated, in the form of dizziness, headache, dryness of the mouth, tinnitus, nervousness, nausea, and drowsiness, but the symptoms disappeared gradually while the drug was being administered. No effect on the blood count was noted in patients taking pyribenzamine. The majority of patients required only two tablets per day, but continuous administration was necessary to prevent recission of symptoms.

### *Prognosis in Carcinoma of the Stomach*

THE findings in a five-year follow-up of 1,495 cases of primary carcinoma of the stomach are reported by W. L. Harnett, Medical Secretary of the clinical cancer research committee of the British Empire Cancer Campaign (*British Journal of Surgery*, April, 1947, 34, 379). There were 856 males (11.7 per cent. of all male cases of cancer registered) and 549 females (6.9 per cent. of all female cases). A history of previous long-continued dyspepsia was obtained in 19.6 per cent. of patients. Definite pain after food was the first symptom in 24.7 per cent. of patients, and vague dyspeptic symptoms in 18 to 22 per cent. Sudden onset with hæmatemesis occurred in 1.5 per cent., whilst in 0.6 per cent. there were no symptoms directly referable to the stomach and the condition was first diagnosed at operation or necropsy. More than half

the patients (54.5 per cent.) consulted their doctors within the first three months. In only 3.8 per cent. of patients was there no loss of weight, and in 49 per cent. a palpable tumour was present. At subsequent operation the site of the disease was found to have been correctly indicated by X-rays in 90 per cent. of pyloric cases, 75.5 per cent. of cardiac cases, and in 60 per cent. of mid-gastric cases. Achlorhydria was found in 76 per cent. of 163 cases in which a test meal was performed. Operation was performed in 49.2 per cent. of the patients, radiotherapy in 2.3 per cent.; the remainder were considered unsuitable for either. The resectability rate was only 17.3 per cent. After excluding operative fatalities the survival rate for all radical operations averaged 23.1 per cent. Resection before the lymph nodes were involved gave 60 to 63 per cent. of normal expectation of life over a five-year period of observation. After involvement of the lymph nodes the figure was 40 to 43 per cent. The average for all cases, including those not treated, was 27.4 per cent. of normal.

### *B.C.G. Vaccination*

IN a fully documented review of the results of B.C.G. vaccination in Scandinavia during the last twenty years, K. Birkhaug, Director of the National B.C.G. Laboratory, Bergen, (*American Review of Tuberculosis*, March 1947, 55, 234) concludes that B.C.G. vaccination does not imply any risk whatsoever of a subsequent infection caused by the vaccine, and it accomplishes almost the same protective function against tuberculous disease as does a natural infection with virulent tubercle bacilli. In Norway it was found that using the subcutaneous method of vaccination, abscesses occurred in 10 to 25 per cent. of cases, but since the introduction of the intracutaneous route this incidence of abscesses has fallen to 5 per cent. In Bergen, practically 10,000 individuals have been vaccinated between 1937 and 1946, and amongst these only one-ninth as much pulmonary tuberculosis and one-sixth as much "non-destructive" tuberculosis has occurred as among the general population of Bergen during the same period. In Norway a law has now been passed rendering obligatory B.C.G. vaccination of all negative tuberculin reactors in the public schools, and at the same time to encourage voluntary vaccination of every negative tuberculin reactor between the ages of fifteen and fifty years, with re-examination every fourth year. In Denmark all school children between ten and fourteen years of age will have been vaccinated with B.C.G. during 1946 and 1947, provided they are negative tuberculin reactors.

### Treatment of Muscular Cramps with vitamin B<sub>2</sub>

THE value of vitamin B<sub>2</sub> in the treatment of muscular cramps is discussed by L. Rouguès (*Presse Médicale*, June 28, 1947, 55, 441), who cites the results obtained and reported by Perault, Bouvier and Boulanger (*Paris Médical*, 1946, 36, 549). Following the treatment of a forty-eight year old man with chronic oxycarbonate poisoning manifested almost exclusively by painful muscular asthenia, who was given vitamin B<sub>2</sub> in dosage of 18 mgm. daily by mouth, and who showed remarkable improvement after the second day's treatment followed by cure after some days, the authors treated a number of patients with muscular cramp of varied origin—diabetes, circulatory disturbances, infections, and diverse cases of intoxication, with equally good results. The usual dosage was 15 to 25 mgm daily, but higher dosage can be employed without fear of toxic reactions.

### Folic Acid in the Treatment of Pernicious Anæmia

A REPORT of the results obtained in seven cases of Addisonian pernicious anæmia treated with folic acid is given by N. B. Kurnick (*American Journal of the Medical Sciences*, June 1947, 213, 694). A synthetic preparation of the *L. casei* factor from liver was used in dosage varying from 2.5 to 30 mgm. daily by mouth. There was subjective improvement in appetite and general well-being about the fourth day of treatment; gastro-intestinal symptoms subsided within a week, and glossitis disappeared within the same period. The reticulocyte response occurred within the third and seventh days of treatment and reached its peak between the seventh and tenth days; leucopenia and thrombocytopenia disappeared. No modification of achlorhydria was noted, and neurological complications, when present, showed only minimal improvement. The minimal therapeutic dose for maximal response is 2.5 mgm., or less, daily, but when infection is present larger doses are necessary. Folic acid therapy did not prove effective in anæmia and leucopenia due to acute myelogenous leukemia or Hodgkin's disease.

### Treatment of Asthma in Childhood

THE following are some of the points stressed by B. Ratner (*Medical Clinics of North America*, May 1947, p. 537) in discussing the choice of drugs in the treatment of asthma in children. A child should never be given an injection of adrenaline of more than 2 or 3 minims (0.12 to 0.18 c.cm.), and this should be given subcutaneously or intradermally; it should never

be given intravenously or intramuscularly. The objections to larger doses are that they are liable to cause (a) further bronchiolar constriction; (b) an enhancement of apprehension; (c) acceleration of the pulse; (d) rise of blood pressure; (e) headache; (f) cardiac syncope; (g) pallor. There is no point in using adrenaline in oil. Inhalations of adrenaline should be deprecated because they lead to habit-formation and overdosage. Ephedrine, whether prescribed for oral administration or as nasal drops, should only be prescribed for individual attacks and for a limited number of doses. If in a given case there is no response to injections of adrenaline, syrup of ipecacuanha is recommended in emetic doses:  $\frac{1}{2}$  to 1 teaspoonful for infants and young children; if this dose does not produce emesis, then 2 teaspoonful are given. For older children and young adults, repeated doses are given until emesis results. "If this therapy is effective, the result is brilliant because relief from distress follows quickly upon release of the plugs". The use of morphine in asthma is considered to be "little short of criminal" as it inhibits the respiratory centre and causes broncho-constriction. Aminophylline is considered to be of value, but less valuable than in adults. It should be given intravenously or intramuscularly. Benadryl and pyribenzamine are not recommended as they are liable to exacerbate the condition. Histaminase is not considered to be of value. After the attack a salt-free diet, high in carbohydrate, should be given, with plenty of fluids.

### Tryparsamide in the Treatment of Syphilis

In a review of the present status of tryparsamide in the treatment of neurosyphilis, based upon a study of the literature and a series of 139 cases of asymptomatic neurosyphilis and 126 cases of tabes dorsalis, H. Koteen (*American Journal of the Medical Sciences*, May 1947, 213, 611) points out that pharmacologically it possesses very little spirochætocidal activity, compared with the trivalent arsenical salts, such as arsenoxide. Experimentally, pentavalent arsenical salts, such as tryparsamide, are not therapeutically active until they are reduced to the trivalent form, and they possess no greater affinity for the central nervous system, or ability to penetrate the central nervous system, than the trivalent salts. As more than half the tryparsamide administered is excreted unchanged in the urine within six hours, and 80 to 90 per cent. is excreted within twenty-four hours, there is clearly little possibility of its being reduced to the therapeutically active trivalent form. Clinically it was found that, as

## *Pyribenzamine in the Treatment of Hay Fever*

THE results obtained in the treatment of 82 cases of ragweed hay fever with pyribenzamine alone and in conjunction with ragweed desensitization are recorded by H. Leibowitz, I. Maxwell Kurtz and E. Schwartz (*New York State Journal of Medicine*, May 1, 1947, 47, 989). Pyribenzamine [diaminobenzopyridyl HCl (*n*'-pyridyl-*n*'-benzyl-*n*-dimethylethylene-diamine hydrochloride)] was given orally in dosage of 50 mgm. twice daily, after breakfast and before bedtime. The patients were divided into three groups, group 1 receiving pyribenzamine alone, group 2 pyribenzamine and ragweed desensitization, and group 3 ragweed desensitization alone. In group 1, symptomatic relief was obtained in 9 out of 21 cases (43 per cent.); in group 2, in which the best results were obtained, 35 out of 47 cases were relieved (74 per cent.). The top dosage of ragweed was reached by mid-August and then reduced for maintenance throughout the season, pyribenzamine being added at the onset of the season and administered twice daily. In group 3 relief was obtained in 10 out of 18 cases (55 per cent.). Side-reactions occurred in 36 per cent. of the patients treated, in the form of dizziness, headache, dryness of the mouth, tinnitus, nervousness, nausea, and drowsiness, but the symptoms disappeared gradually while the drug was being administered. No effect on the blood count was noted in patients taking pyribenzamine. The majority of patients required only two tablets per day, but continuous administration was necessary to prevent remission of symptoms.

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As adviser in neurology to the M.E.F. Dr. Spillane has contributed much to the knowledge of the effects of malnutrition upon the central nervous system. In this monograph he has summarized his findings and linked them up with a critical review of the present state of knowledge concerning this important, though confused, subject. The whole range of neurology is covered, with particular emphasis upon polyneuritis, beri-beri, Wernicke's encephalopathy, and subacute combined degeneration of the cord. The introductory chapter is devoted to a useful summary of the present status of the vitamin B complex, and the book concludes with a valuable appendix of over 50 pages devoted to the author's own case notes. Preserving a happy balance between the cynicism of the orthodox neurologist and the uncritical enthusiasm which is such a disturbing feature of modern nutrition, the author has performed a useful service by bringing together in this monograph the welter of data available and presenting it to his readers in a reasoned and critical manner. As Dr. Riddoch says in his introduction, "it is, in fact, an interesting, balanced and critical account of a fascinating subject".

judged by laboratory and clinical data, no greater improvement was obtained in patients treated with tryparsamide than in those treated with other anti-syphilitic measures, such as trivalent arsenical preparations, bismuth, malaria, and penicillin. A further drawback to the use of tryparsamide is the high incidence of damage to the optic nerve. This occurred in 45 per cent. of all tabetics who received tryparsamide, and in 20 per cent. of cases permanent damage resulted, as exemplified by pallor of the disc or restriction of the fields of vision. In attempting to explain the apparently successful results with tryparsamide in neurosyphilis that have been reported, it is considered that these may be due to the concomitant use of bismuth and mercury, or to the fact that before the use of tryparsamide the patients had been treated with trivalent arsenical salts or malaria, and that the improvement has been due to these and not to the tryparsamide. The present position is summed up as follows: "There are alternative methods for treating all forms of neurosyphilis in which tryparsamide is said to be of value, and none of these regimens is as dangerous as one employing tryparsamide".

### *Penicillin and Menstrual Disturbances*

In a series of 216 non-pregnant women receiving treatment for venereal disease, and observed for a minimum of four post-therapeutic cycles, A. E. W. McLauchlan and D. D. Brown (*British Journal of Venereal Diseases*, March 1947, 23, 1) found menstrual cycle sequelæ in 91.3 per cent. of cases. These sequelæ included alterations in the length of the menstrual cycle, in the duration of menstruation, and in the amount of menstrual loss. The occurrence of menstrual clotting for the first time was noted in 12.1 per cent. of patients. Premenstrual and menstrual dysmenorrhœa was induced in approximately one-third of the cycles, whilst some 10 per cent. of patients normally subject to dysmenorrhœa, experienced temporary or permanent relief. The mittelschmerz phenomenon was noted in 8 patients who had never previously experienced it. Among 32 pregnant women treated with penicillin, uterine cramps occurred in 12, three of whom also experienced uterine bleeding. The cramps usually occurred on the first day after the second or third injection of penicillin. The bleeding was never severe. Labour occurred in five patients, and in one of these it followed immediately upon uterine cramps initiated by penicillin in the

seventh month of pregnancy. Alterations in the lochia were observed in 12 out of 16 puerperal patients receiving penicillin during the first fortnight of the puerperium. In the same series of puerperal women lactation was diminished in twelve women during the period when penicillin was being given, and in 25 per cent. of these cessation of lactation was permanent. "It is believed that these phenomena are caused by the penicillin available to us or to the impurities inseparable from the process of manufacture. That the latter hypothesis is the case is suggested by the decreasing frequency in recent months of such reactions, despite greatly increased penicillin dosage, and by the absence of sequelæ in two patients treated with pure penicillin."

### *Penicillin for Septic Hands*

As a result of his experience with a small series (about 30) of cases of septic hands in a factory, G. P. B. Whitwell (*British Journal of Physical Medicine*, May-June 1947, 10, 78) considers that penicillin is of value in the treatment of such cases. The type of lesion treated included paronychia, "boil-like lesions of the dorsum of the finger or hand", whitlows of the middle or the proximal phalanx, cellulitis of the web-spaces, collar-stud abscesses of the palm, and cellulitis around neglected cuts. The usual dosage of penicillin was 100,000 units in distilled water, given intramuscularly night and morning. In severe cases up to 400,000 units have been given. Whenever there was a wound cavity, penicillin in the form of tablets or solution was applied locally. Local treatment consisted of "local rest, the sparing use of hot soaks, and magnesium sulphate paste". Surgical interference was seldom required, and consisted usually of evacuation of pus, if present, and removal of necrosed skin. None of the patients required hospital treatment, and full function was restored in every case. Stress is laid upon the good general condition of the patients, with no insomnia, anorexia or drawn features. The danger of conservative treatment in such cases is fully appreciated, and attention is drawn to the fact that no pulp infections of the terminal phalanx were treated. Patients must be seen by a medical officer twice daily. "Although penicillin appears to extend greatly the scope of conservative treatment, it does not abolish surgery. It would seem to be at its best in the early treatment of cases in the cellulitis stage, before pus is present. It rapidly abolishes lymphatic spread."

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*Parenteral Alimentation in Surgery.* By ROBERT ELMAN, M.D. London: Hamish Hamilton Medical Books, 1947. Pp. xx and 284. Figures 31. Price 21s.

THIS book is concerned with much more than its title indicates, for it deals with the administration of water, salts, vitamins, plasma, and blood as well as foodstuffs, and with their use in diseases other than surgical; but, as is natural in view of the writer's authoritative position in this field, its interest is mainly focused on the treatment of protein deficiency by the intravenous injection of hydrolysates and amino-acids. A brief and lucid account of the part played by proteins in the body economy is followed by a description of the clinical manifestations of protein deficiency in starvation; after operation, and in such conditions as burns, obstruction and peritonitis. Early work in the preparation of amino-acids is reviewed, and finally there is a full account of the indications for their use and the technique of administration. The book will be welcomed as a valuable and authoritative contribution to a problem of great practical importance.

*The Childbearing Years.* By C. SCOTT RUSSELL, F.R.C.S.ED., M.R.C.O.G. Oxford: Blackwell Scientific Publications, 1947. Pp. vii and 88. Figures 11. Price 7s. 6d.

THESE are the days of the intelligent "women's guides" to most subjects. Following the Shavian example, Mr. Scott Russell has written one on the intelligent woman's guide to obstetrics and gynaecology. One's reactions to books of this type depend upon whether or not one agrees with their aims. If the answer be "yes" then Mr. Scott Russell can be congratulated on his attempt at blending physiological and pathological technical knowledge for the laywoman. If the answer be "no" then a book of this type is of more use to a health visitor or midwife to help her to understand the problems of her patients. To such the book can be recommended. What comfort can be found by the ordinary pregnant woman in admirably concise accounts of ante- and post-partum hæmorrhage and other dramatic complications? These might well prove disturbing even to the intelligent woman, as intelligence does not necessarily imply balance. The style of the book is on the whole good, although marred by a tendency to generalizations and some inaccuracies which will be corrected in later editions, e.g., on page

*Atlas of Bacteriology.* By R. CRANSTON LOW, M.D., F.R.C.P.ED., F.R.S.E., and T. C. DODDS, F.I.M.L.T., F.I.B.P., F.R.P.S. Edinburgh: E. & S. Livingstone Ltd., 1947. Pp. vii and 168. Figures 168, 167 in colour. Price 32s 6d.

THE authors have succeeded in producing a very good atlas of bacteriology which should prove useful to the medical student starting to study this subject. The book contains 168 illustrations, of which 167 are in colour. The bacteria are shown in pus, tissue, sputum or other clinical material, in films from cultures, and in sections of tissue. Cultures in petri dish or test tube on the medium usually employed for each organism, are also illustrated. Certain technical difficulties in photography were encountered which may well be overcome in a subsequent edition. The pictures, for the most part, give an accurate description of what is actually seen in laboratory preparations, which is an advantage over more diagrammatic representations.

*A History of the Worcester Royal Infirmary.* By W. H. McMENEY, D.M. Foreword by The Rt. Rev. William Cash, D.S.O., O.B.E., D.D. London: Press Alliances Ltd., 1947. Pp. xvi and 356. Illustrations 47. Price 21s.

TITUS "labour of love", as the Bishop of Worcester describes it in his foreword, has been written to commemorate the bicentenary of the Worcester Royal Infirmary. It is not the first history of the hospital, but in its range and detail it will remain the standard work of reference on the subject for many years to come. The author has clearly been at great pains to incorporate all the available data, and he has included brief biographies of many of the leading figures associated with the hospital in its long and honourable career. The name of Sir Charles Hastings will always link Worcester closely with medical history, and one of the most interesting chapters in the book is that describing Hastings's work for his hospital. The provincial hospitals of this country have a wealth of historical material locked away in their records, and it is to be hoped that some of the older ones amongst them will be inspired to emulate the example of Worcester. There is a tendency for medical history to be based upon the records of the teaching hospitals and their staffs, entirely overlooking the fact that the bulk of the profession

obtained of the development of medical science in this country during the last two hundred years. In these times, when the days of voluntary hospitals are numbered, records as this are of outstanding value.

### NEW EDITIONS

*Principles and Practice of Medicine*, by Henry A. Christian, A.M., M.D., LL.D., Sc.D., F.R.C.P., F.A.C.P., the sixteenth edition of Osler's world-famous treatise on the subject (J. Appleton-Century Company Inc., \$10), contains a wealth of new material in accordance with advances in medicine, although only three years have elapsed since the appearance of the twelfth edition. Chief among these advances are, of course, the antibiotic drugs, which have crept into the therapy of infective diseases and their inclusion has necessitated extensive revision. The new edition is a fine production and should have its place in the library of all those studying or practising medicine.

THE successful use of implants of desoxycorticosterone in the treatment of Addison's disease, with an account of the cure of a severe case with complete disappearance of pigmentation, is an interesting addition to *Recent Advances in Endocrinology*, by A. T. Cameron, C.M.G., D.Sc., F.R.I.C., F.R.S.C., in its sixth edition (J. & A. Churchill Ltd., 21s.). Only two years have elapsed since the appearance of the previous edition, but during that time a number of advances in endocrinology have been developed and these have been included in the new edition, which is well illustrated and has a rich bibliography.

FOUR new authors have contributed to *Textbook of Surgical Treatment*, edited by C. F. W. Illingworth, C.B.E., M.D., CH.M., F.R.C.S.ED., in its third edition (E. & S. Livingstone Ltd., 32s. 6d.): A. B. Wallace on "Plastic Surgery", Roland Barnes on "Rehabilitation", I. G. Macadam on "Penicillin in Surgery", and Professor Aird, who has rewritten the chapter on "Wounds and Wound Infections". Among other additions is a new section on "Facio-Maxillary Injuries", by T. Gibson. The great interest in, and demand for, plastic surgery following the late world war, and the introduction of penicillin in surgery, make these additions of outstanding importance in the new edition of this well-known surgical textbook, which contains a wealth of new material, including a welcome section on the use of protein in surgery.

AMONG the new additions to *Cushny's Pharmacology and Therapeutics*, revised by Arthur Grollman, A.B., Ph.D., M.D., F.A.C.P., and Donald Slaughter, B.S., M.D., in its thirteenth edition (J. & A. Churchill Ltd., 45s.) is a useful section on the antibiotics in which the actions and uses of penicillin, streptomycin, tyrothricin and gramicidin S are discussed in detail. Another section is devoted to the anticoagulants, heparin and dicoumarol. The new edition has been brought up to date in all sections, is well illustrated and reflects credit on the co-editors who have so successfully maintained the well-known and much appreciated character of this old-established textbook.

*Diseases of Metabolism*, edited by Garfield G. Duncan, M.D., in its second edition (W. B. Saunders Company, 60s.) is a comprehensive work in which each aspect of metabolic disorder is discussed by well-known American specialists. The editor contributes a chapter on diabetes mellitus; vitamins and avitaminoses are dealt with by Tom D. Spies and Hugh R. Butt; disorders of the thyroid gland by Alexander W. Winkler; all the many aspects of diseases and disorders due to metabolic disturbance are included in a work which is beautifully produced and illustrated. Written for the medical practitioner, the new edition will be assured of a warm welcome.

NINE years have elapsed since the appearance of the seventh edition of *Clinical Examination of the Nervous System*, by G. H. Monrad-Krohn, M.D., F.R.C.P., and the eighth edition (H. K. Lewis & Co. Ltd., 16s.) which was in the process of preparation at the outbreak of the world war, contains much new material. The chapter on Egaz Moniz's angiography includes the percutaneous method with perabrodil, developed by the author and his colleagues, Kristiansen, Emblem and Engeset, during the war years, and now adopted as the routine method of intracranial diagnosis at the University Clinic for Nervous Diseases, Oslo.

*Modern Methods of Feeding in Infancy and Childhood*, by Donald Paterson, M.D., F.R.C.P., and J. Forest Smith, F.R.C.P., in its ninth edition (Constable, 8s. 6d.) contains among other additions new information on the diet necessary in coeliac disease, and diet sheets for use in the different stages of the disease are given. Post-war austerity has prevented revision to peace-time diet sheets, but some revision has been carried out in respect to the use of evaporated milk.



*Parenteral Alimentation in Surgery.* By ROBERT ELMAN, M.D. London: Hamish Hamilton Medical Books, 1947. Pp. xx and 284. Figures 31. Price 21s.

THIS book is concerned with much more than its title indicates, for it deals with the administration of water, salts, vitamins, plasma, and blood as well as foodstuffs, and with their use in diseases other than surgical; but, as is natural in view of the writer's authoritative position in this field, its interest is mainly focused on the treatment of protein deficiency by the intravenous injection of hydrolysates and amino-acids. A brief and lucid account of the part played by proteins in the body economy is followed by a description of the clinical manifestations of protein deficiency in starvation, after operation, and in such conditions as burns, obstruction and peritonitis. Early work in the preparation of amino-acids is reviewed, and finally there is a full account of the indications for their use and the technique of administration. The book will be welcomed as a valuable and authoritative contribution to a problem of great practical importance.

*The Childbearing Years.* By C. SCOTT RUSSELL, F.R.C.S.ED., M.R.C.O.G. Oxford: Blackwell Scientific Publications, 1947. Pp. vii and 88. Figures 11. Price 7s. 6d.

THESE are the days of the intelligent "women's guides" to most subjects. Following the Shavian example, Mr. Scott Russell has written one on the intelligent woman's guide to obstetrics and gynaecology. One's reactions to books of this type depend upon whether or not one agrees with their aims. If the answer be "yes" then Mr. Scott Russell can be congratulated on his attempt at blending physiological and pathological technical knowledge for the laywoman. If the answer be "no" then a book of this type is of more use to a health visitor or midwife to help her to understand the problems of her patients. To such the book can be recommended. What comfort can be found by the ordinary pregnant woman in admirably concise accounts of ante- and post-partum hemorrhage and other dramatic complications? These might well prove disturbing even to the intelligent woman, as intelligence does not necessarily imply balance. The style of the book is on the whole good, although marred by a tendency to generalizations and some inaccuracies which will be corrected in later editions, e.g., on page 57 "spesis" for antiseptis, and on page 63 calcium chloride for calcium hypochlorite.

*Atlas of Bacteriology.* By R. CRANSTON LOW, M.D., F.R.C.P.ED., F.R.S.E., and T. C. DODDS, F.I.M.L.T., F.I.B.P., F.R.P.S. Edinburgh: E. & S. Livingstone Ltd., 1947. Pp. vii and 168. Figures 168, 167 in colour. Price 32s 6d.

THE authors have succeeded in producing a very good atlas of bacteriology which should prove useful to the medical student starting to study this subject. The book contains 168 illustrations, of which 167 are in colour. The bacteria are shown in pus, tissue, sputum or other clinical material, in films from cultures, and in sections of tissue. Cultures in petri dish or test tube on the medium usually employed for each organism, are also illustrated. Certain technical difficulties in photography were encountered which may well be overcome in a subsequent edition. The pictures, for the most part, give an accurate description of what is actually seen in laboratory preparations, which is an advantage over more diagrammatic representations.

*A History of the Worcester Royal Infirmary.* By W. H. McMENEY, D.M. Foreword by The Rt. Rev. William Cash, D.S.O., O.B.E., D.D. London: Press Alliances, Ltd., 1947. Pp. xvi and 356. Illustrations 47. Price 21s.

THIS "labour of love", as the Bishop of Worcester describes it in his foreword, has been written to commemorate the bicentenary of the Worcester Royal Infirmary. It is not the first history of the hospital, but in its range and detail it will remain the standard work of reference on the subject for many years to come. The author has clearly been at great pains to incorporate all the available data, and he has included brief biographies of many of the leading figures associated with the hospital in its long and honourable career. The name of Sir Charles Hastings will always link Worcester closely with medical history, and one of the most interesting chapters in the book is that describing Hastings's work for his hospital. The provincial hospitals of this country have a wealth of historical material locked away in their records, and it is to be hoped that some of the older ones amongst them will be inspired to emulate the example of Worcester. There is a tendency for medical history to be based upon the records of the teaching hospitals and their staffs, entirely overlooking the fact that the bulk of the profession have practised in the provinces. It is only by histories such as this that a true perspective can

Yet even to this day the exact mode of action is far from clear. Purified preparations obviously lack some factor or factors which raw liver, crude extracts or proteolysed liver contain, as judged from results in the clinical field. The interpretation of these results is a puzzle which the chemists have not yet unravelled, despite brilliant experimental work and ingenious theorizing. One more link has been forged in the chain by the discovery of the hæmopoietic properties of folic acid, a member of the vitamin B<sub>2</sub> complex, known as an essential foodstuff for many years and under a variety of names. Folic acid is found in natural foodstuffs in conjugated form. Deficiency in the body may arise from dietary insufficiency, as with nutritional macrocytic anæmia; from inability to break the conjugation, as with Addisonian anæmia, or from inability to absorb the free acid, as with the sprue syndrome. Such deficiencies give rise to a megaloblastic type of anæmia, and the beneficial action of folic acid is confined to anæmias of this hæmatological type. Folic acid also influences leucocyte and platelet production, but its value in the therapeutic field is entirely confined to those leucopenic and thrombocytopenic states which have a nutritional origin. The details of folic acid therapy are described elsewhere in this number.

#### RADIOTHERAPY

Radiotherapy has long been the only alternative to surgery, with which it may be combined, for the treatment of malignant disease. With new methods, providing new and more powerful beams, which do relatively little damage to superficial or overlying tissues, the scope and effectiveness of ray therapy bid fair to advance, perhaps even to achieve, the success which has been obtained in malignant disease of the skin and mucous membranes. *Radiocobalt*, in that it has a steady output of gamma radiation, offers possibilities of a source of radiation with an intensity five times greater than many of the beam units which are available, and then only in a limited number of centres. But most interest has naturally centred on the possibility of irradiating specific cells and tissues by the selective absorption of suitable *radio-active isotopes*. In this respect the field is not very large, for as Rhoads has said: "To expect inorganic elements to be picked up so selectively and concentrated so adequately by cancer cells, as compared with normal tissue, is a very optimistic hope". Furthermore, it is only those isotopes which emit beta particles of low energy that are in general desirable in order that action may be limited to specific tissues and cells. So far, only radio-active phosphorus and radio-active iodine have been proved to have a therapeutic use. The former is selectively absorbed largely by bone and the latter by the thyroid gland.

*Radiophosphorus* has been found to be very effective in the treatment of polycythæmia vera, and is probably the best therapeutic agent for this disease (Mitchell, 1947). It is prepared as an isotonic Na<sub>2</sub>HPO<sub>4</sub> solution (15 mgm. per litre) with an initial radio-activity of approximately 300 mc. per litre. Doses of 2 to 4 mc. have caused a disappearance of symptoms and

one of the weaknesses of this promising chemotherapeutic agent is the speed with which organisms can develop resistance.

Whereas the basic fact which constitutes an advance in medicine may come suddenly, nevertheless the perfection and complete understanding of the work usually occupy many years. For example, among the outstanding discoveries of the second decade of the century can be counted the preparation of insulin by Banting and Best, the demonstration of the hæmopoietic value of liver by Minot and Murphy, and the little-noticed publication on penicillin by Alexander Fleming. None of these great discoveries is even yet stabilized or fully exploited. There is still no agreement as to whether globin insulin is superior to the protamine type, although the former would appear to be favoured by the most recent American reports (Roberts and Yates, 1947). Even now, it is not possible to determine the insulin content of the blood, although the perfection of this delicate technique appears to be within the realm of possibility (Best, 1947).

#### PENICILLIN

Fleming's discovery required the stimulus of war to apply it to the field of everyday medicine. Only recently has any idea been formed as to the complexity of what, at first sight, appeared to be a simple substance. Only in the past year has any rational suggestion been made as to the mode of action, following upon the notable deduction from experimental work that penicillin prevents the passage of glutamic acid through the cell wall of an organism, thereby depriving it of a material necessary for the synthesis of proteins within the bacterium. Surprisingly, work in the same field has revealed that the effect of sulphonamides is to produce an abnormal accumulation of glutamic acid within the organism which is apparently unable to utilize this substance. It is therefore clear that these two groups of antibacterial agents work in entirely different ways. This short and simplified account of what lies behind the regular prescribing which most of the profession carry out on almost any working day should indicate the important place which chemistry has come to occupy in modern medicine. Meanwhile, we may, in practice, take some heart that penicillin, when properly used and in appropriate dosage, is a most powerful weapon against common fatal infections, as well as a promising remedy for the cure of a one-time always fatal disease, i.e. subacute bacterial endocarditis. For this last disease the treatment must be prolonged for four weeks or longer and the dose has to be of the order of one half to one million units daily, according to the sensitivity of the infecting organism. With appropriate dosage, sufficiently prolonged, the recovery rate in subacute bacterial endocarditis is estimated to be from 50 to 60 per cent. With inefficient dosage, penicillin resistance may be developed.

#### FOLIC ACID

Minot's discovery of the potency of liver must, in the intervening twenty years, have led to the production of an immense volume of literature.

of the newer nitrogen and sulphur mustards were properly appreciated. As soon as it was found that proliferating cells were more susceptible than static cells, the therapeutic possibilities of these compounds were obvious.

The sulphur mustards cannot be used clinically on account of their intense chemical reactivity and undesirable side-effects. On the other hand, various nitrogen mustards provide a number of compounds with differing reactivity and with less toxic action. Threshold doses of certain nitrogen mustards appear to have a specific effect on cell nuclei, especially dividing cells, which is comparable to that caused by irradiation. Minimal doses inhibit mitosis, although if mitosis has begun the process is completed normally; large doses cause nuclear fragmentation and disorganized chromatin dispersal. Delayed toxic effects are manifested mainly in the blood-forming tissues, and lead to lymphopenia, leucopenia, thrombocytopenia and eventually to a depression of erythropoiesis.

With the nitrogen mustards the most favourable results have been obtained in polycythæmia vera and in Hodgkin's disease (Jacobson *et al*, 1946). In Hodgkin's disease symptoms have been quickly relieved, whilst enlargement of the lymph glands, spleen and liver quickly declined. Clinical remissions have been as long as eighteen months. In this country, Ap'Thomas and Cullumbine (1947) have reported on the palliative use of two types of nitrogen mustard in the treatment of extensive Hodgkin's disease; they state that symptoms can still be alleviated in cases in which radiotherapy has been abandoned, but they express the opinion that radiotherapy is preferable as a first treatment, in that the improvement is maintained longer and is obtained with less toxic effect, even though the response is slower. So far, nitrogen mustards, like irradiation, have failed to cure Hodgkin's disease. But the important principle has been established that changes similar to those caused by irradiation can be brought about by relatively simple chemical substances, thus opening up one more line of chemotherapeutic treatment. Furthermore, the potential experimental field is very large, in that hundreds of variants await synthesis and evaluation with a reasonable chance that some of the variants may not possess the disadvantages of those which have so far been assayed. No success has yet been obtained by using the nitrogen mustards for the treatment of frankly cancerous conditions, or in leukæmias, in reticulum-cell sarcoma, or in mycosis fungoides. Some improvement has occasionally been recorded with lymphosarcoma.

#### NEW DRUGS

In 1946, McCombie and Saunders described the preparation of alkyl fluorophosphonates. Since then this group has received further study on account of pharmacological properties, which include a pronounced anticholinesterase effect. *Di-iso-propyl fluorophosphonate* (D.F.P.) has been used for the treatment of glaucoma and for the relief of symptoms in myasthenia gravis. In the normal eye, the action of D.F.P. is to cause a prolonged

enormous relief, with remissions lasting for as long as two years without further treatment. On the other hand, the results in leukaemia have been disappointing. In chronic myeloid leukaemia the effects are comparable to those with ordinary X-ray treatment, with the advantage that there is no irradiation sickness. But there is no prolongation of life, and there is considerable difficulty in arriving at the correct dose, thus introducing an indefinite hazard from the effects of the radiations. In most institutions there is a tendency to discard radiophosphorus and to use the conventional X-rays as being somewhat safer and more predictable in results, and with less risk to the patient. In chronic lymphatic leukaemia the results with radiophosphorus have been moderately satisfactory, but no better than with X-rays, if as good; with the acute leukaemias and monocytic leukaemia no effect can be expected. It seems unlikely that radiophosphorus will be of any value in malignant disease. Hodgkin's disease, lymphosarcoma, reticulum-cell sarcoma and multiple myeloma do not respond as well as to X-radiation.

*Radio-active iodine* has been found to be valuable in the treatment of hyperthyroidism and in certain forms of thyroid cancer. This is mainly because of the great avidity for iodine which an overactive thyroid exhibits, and which confines the irradiation effect to the cells which it is desired to irradiate. Good clinical results have been reported, but it is not easy to gauge the treatment dose, nor is it yet possible to say what the end-result may be. In malignant disease it is only the less active types which respond; quickly dividing malignant cells do not selectively absorb iodine.

#### NITROGEN MUSTARDS

Any advance in the treatment of malignant disease must be accounted creditable, and the development of radiotherapy during the past twenty years has been outstanding. Nevertheless, it is as well to appreciate the basic action of radiotherapy, the chemical changes which it brings about, for therein lies the hope of controlling malignant disease in the future. Rays cause profound biochemical alterations in a cell, particularly in the nucleus. The exact chemical changes are only beginning to be understood, but there is some evidence that the synthesis of thymonucleic acid and ribonucleic acid is inhibited (Mitchell, 1943), and these substances are important constituents of chromosomes in the metaphase. Irradiation is therefore no more than a crude means of influencing a delicate chemical reaction. This immediately brings the control of malignant disease within the orbit of chemotherapy, and a hint that control may eventually be obtained has been given by the remarkable effect of stilbæstrol upon prostatic cancer.

No one foresaw that with the invention of mustard gas a promising field of investigation for the treatment of malignant disease would be opened up. In the 1914-18 war the side-effects, such as the action of mustard gas on the hæmopoietic system, the gastro-intestinal tract and electrolytic balance, were observed. But it was not until the recent war that the cytotoxic effects

Numerous fungicides are known, but many are apt to cause dermatitis, upon which secondary infection quickly becomes imposed. As long ago as 1939, Peck *et al.* pointed out that a number of the fatty acids found in sweat are fungicidal and fungistatic, and they were the first to suggest the use of sodium propionate. Keeney (1943) found that caprylic acid, propionic acid and undecylenic acid were suitable as fungicides, whilst Wyss *et al.* (1945), after an extensive investigation, have concluded that the long-chain saturated and unsaturated fatty acids are superior to other acids and their related derivatives, both in their inhibition of fungus growth and in the killing of spores. There can be no doubt that the various fatty acid preparations represent a great step forward in the treatment of fungus infections; they are possibly not as fungicidal as some of the older preparations, but they are less irritating, and therefore better tolerated by an inflamed skin than preparations which contain sulphur, salicylic acid, benzoic acid, thymol, or tar. Undecylenic acid can be used in a strength of 5 per cent. in a suitable base.

*Lupus vulgaris*.—The calciferol treatment of lupus vulgaris can now be considered to be sufficiently established to constitute an outstanding advance in the control of this otherwise intractable condition, which causes so much misery. It is discussed more fully on p. 281.

#### BODY PROCESSES

New advances in treatment in general medicine obviously depend upon a fuller understanding of body processes. In this field the numerous studies now being made with radio-active isotopes, the so-called tracer elements, are daily adding to knowledge. Many years will elapse before this field is exhausted, and the potentialities are beyond the bounds of ordinary imagination. Even preliminary work has shown to what an astounding extent the chemical substances in all tissues are replaced during the life span. It is thought that within the space of ten years every molecule present in the living body of man will have been replaced by a new molecule synthesized within the framework of the living cells. Radio-active carbon, nitrogen, phosphorus, sodium and iron have obviously a great application in the study of body metabolism. Radio-active phosphorus, for example, has already revealed something of the metabolism of different nucleotides in normal and tumour cells and the effect of irradiation thereon, the formation of phosphatides in the liver and the origin of milk phosphorus. Radio-active sodium chloride has been used to study the rate of distribution by the blood stream, and to measure the lymph volume of particular organs. Radio-active iron has demonstrated the preference of the blood-forming tissues for iron derived from hæmolysed red cells, rather than for iron supplied in ordinary prescription, even when the latter is given in large quantities. This may well lead to a re-formation of the principles governing iron therapy.

miosis with usually a decrease of intra-ocular tension. The action endures longer than with any of the known miotics, including 1 per cent. eserine, and 5 per cent. neostigmine bromide. Leopold and Comroe (1946) have studied the use of the drug in glaucoma in the form of 0.05 to 0.2 per cent. solutions in peanut (arachis) oil. Solutions in water are unstable and quickly hydrolyse. Preliminary observations show that D.F.P. in this form lasts for about twelve hours in a glaucomatous eye, as compared with about as many days in a normal eye. The present recommendations are daily instillations of 0.1 per cent. drops in an oily base, under hospital conditions with careful control by tonometry until more experience with this promising drug has been obtained. D.F.P. has been used in myasthenia gravis with encouraging results, particularly in relation to reducing the prostigmine requirements. Quilliam (1947) states that "if the promise of usefulness is amply fulfilled, D.F.P. may well take its place alongside the sulphonamides and penicillin as one of the advances of the twentieth century".

A new and effective analgesic related to amidone is now available, and is claimed to have properties which surpass those of any synthetic analgesic hitherto used in medicine. Experimental studies suggest that weight for weight the drug is at least equal to morphine, and that in therapeutic doses it is relatively free from any tendency to produce unpleasant reactions or toxic effects after prolonged administration. The substance, which can be given by oral, intramuscular or intravenous routes, at intervals of three to four hours, consists of *dl-2-dimethylamino-4:4-diphenylheptane-5-one hydrochloride* (Thorpe, Walton and Ofner, 1947) and is marketed under the trade name of *Physeptone*. The drug has been used clinically in a considerable number of surgical and medical conditions, in which it has proved to be fully equal to morphine for the relief of pain. The effect appears to be mainly analgesic with only moderate sedative and hypnotic action.

Benzedrine sulphate (racemic amphetamine sulphate) has been widely used in clinical practice for more than ten years. It has now been found that a closely related compound, *Dextro-amphetamine*, has a more powerful central nervous system stimulating effect, with less peripheral action. Davidoff (1943) compared the effect of amphetamine with dextro-amphetamine and found with the latter a sustained cerebral and psychomotor stimulation particularly useful in depressive states, more especially as the stimulation was unaccompanied by distracting elation, irritability, nervous tension or excitability. The drug is said to be particularly useful in states of depression associated with menstrual dysfunction, the puerperium, the climacteric, and old age.

#### SKIN DISEASES

*Dermatophytosis*.—Fungus infections of the skin were a major problem in the armed Forces, especially in tropical countries; they are also common in civilian practice, as infections of the feet, hands, groins and umbilicus.

# ADVANCES IN SURGERY

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SURGICAL fashions come and go quickly and we must beware of regarding every innovation as an advance, but from time to time a glance backwards may reveal certain changes of practice which have either become established already or appear to be reaching such a state of relative stability that they may reasonably be considered as advances. Such a glance may also indicate the direction in which progress is taking place and as the "Autocrat at the Breakfast Table" was wont to remark: "The great thing in this world is not so much where we stand, as in what direction we are moving".

With the passage of time certain procedures, which when I last wrote on this subject in *The Practitioner* (Rogers, 1938) appeared to be advances, have been found wanting and abandoned and are fast sinking into "the gray twilight of forgotten things". Among these, muscle and omental grafting for cardiac ischæmia, and total thyroidectomy for angina pectoris and cardiac failure may be cited. No doubt another nine years will show that certain of the procedures now considered as advances will likewise be found wanting and relegated to the surgical scrap-heap, whilst others now new and of uncertain value, may not here have been given sufficient consideration; for when it comes to deciding what are really advances and what are just ephemeral innovations the task is a difficult one and even the very elect may be deceived. James Syme, it may be remembered, at the height of his surgical career, described excision of joints, colostomy and the removal of ovarian tumours as objectionable or questionable new methods of treatment. The quotations at the head of this article are further illustrations of how some of the great high priests of our art have been deceived by the state of surgical progress and how difficult it is to prophesy.

## WAR SURGERY

Wars have played an important part in influencing the practice of surgery ever since Ambroise Paré, making a virtue of necessity through his supplies running out, abandoned the practice of pouring boiling oil into wounds and adopted soothing dressings instead. The past war has been no exception, and it is abundantly clear that men wounded in it had a much better chance



## GENERAL TRENDS

In this brief review much emphasis has already been laid upon the part which chemistry, an exact science, is playing in the advance of medical treatment. The medical journals of recent years have been remarkable for the number of articles which stress this point of view. The President of the Royal Society (Robinson, 1946), for instance, speaking of chemistry related to medicine, has said:—

“At the present time the development of chemotherapy is no longer a question of the blind preparation of a series of related compounds to be tested and reported on as good, bad or indifferent. Thanks to the discoveries of Woods, Fildes and others [in relation to the mode of action of sulphonamides] we try to find some rational basis for chemotherapy, and be it right or wrong, a working hypothesis is invaluable. For example, the discovery of paludrine by Curd, Davey and Rose, followed stages suggested by analogies in constitution to known active substances as well as by an hypothesis of the mode of action of anti-malarials”.

Dale (1947) has told the history of this particular point in a fascinating description of how Ehrlich's idea of using methylene blue as an anti-malarial drug has become linked with the centuries-old knowledge as to the action of quinine.

The greatest gap in present-day knowledge is to be found in the field of protein chemistry. The molecular complexity of the proteins and the variety of the complexes is bewildering. Attempts at synthesis will doubtless be successful in the near future, but it will be clear that an understanding of irradiation effects or of the action of such substances as the nitrogen mustards will not be possible until more is known of the various sections of the nucleo-protein molecule, as well as its coenzymes. Likewise with many of the physiologically active proteins. This work will also be advanced by studies with radio-active isotopes, which have so far been mainly exploited in the biological field. When the two approaches, the *in vivo* and the *in vitro*, come to meet, the revelations should profoundly influence medical treatment.

## References

- Ap'Thomas, M. I. R., and Cullumbine, H. (1947): *Lancet*, i, 899.  
 Best, C. (1947): *Brit. med. J.*, ii, 183.  
 Dale, Henry (1947): *Ibid.*, ii, 161.  
 Davidoff, E. (1943): *Med. Rec.*, 156, 422.  
 Jacobson, L. O., et al. (1946): *J. Amer. med. Ass.*, 132, 263.  
 Keeney, E. L. (1943): *Bull. Johns Hopk. Hosp.*, 73, 379.  
 Leopold, I. H., and Comroe, J. H. (1946): *Arch. Ophthalm.*, 36, 1.  
 McCombie, H., and Saunders, B. C. (1946): *Nature*, 157, 287.  
 Mitchell, J. S. (1943): *Brit. J. Radiol.*, 16, 339.  
 — (1947): *Brit. med. J.*, i, 250.  
 Peck, S. M., et al. (1939): *Arch. Derm. Syphil.*, 39, 126.  
 Quilliam, J. P. (1947): *Post-Grad. med. J.*, 23, 280.  
 Roberts, J. T., and Yates, W. M. (1947): *Ann. int. Med.*, 26, 41.  
 Robinson, Robert (1946): *Brit. med. J.*, i, 943.  
 Thorpe, R. H., Walton, E., and Ofner, P. (1947): *Nature*, 159, 679.  
 Wyss, O., Ludwig, B. J., and Joiner, R. R. (1945): *Arch. Biochem.*, 7, 415.

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of recovery than in any former conflict. Analysing the chief surgical advances made during the war, Ogilvie (1945) ascribes these to chemotherapy, readily available blood and plasma transfusions, and modern transport as exemplified by those useful handmaids of all work, the Jeep and the Dakota; a conclusion with which few will disagree.

*Chemotherapy.*—When war broke out the *sulphonamides* had just made their appearance and, as Ogilvie remarks, the value of war as a large-scale experiment in which new methods can be tried and improved is seen particularly in the field of chemotherapy. We now have a reasoned estimate of the value of the different members of the sulphonamide group and their even more effective rival, penicillin. If asked to name the greatest medical development of the war, most people would without hesitation reply, *penicillin*. With its use patients with infective cavernous sinus thrombosis have recovered and likewise others with metastatic intracerebral abscess. On several occasions recently I have had the gratifying experience of seeing patients with these hitherto almost invariably fatal conditions make sound recoveries.

*Streptomycin*, although not devoid of toxic effects, provides us with a new and powerful antibiotic capable of exerting bacteriostatic and bactericidal effects upon gram-negative and acid-fast bacteria. In the attack on the tubercle and the colon bacilli we have here a useful weapon which at the moment is being tested, but already there are indications of great promise for the future control of these infections.

#### VASCULAR SURGERY

*Anticoagulants.*—The use of the anticoagulants, heparin and dicumarol (dicoumarin) has become established, and concurrently the morbidity and mortality from pulmonary embolism have been reduced. A massive dose of heparin (300 mgm.) given to the patient *in extremis* with pulmonary embolism has proved so effective that Trendelenburg's operation for removal of the clot from the pulmonary artery has been rendered obsolete (Bauer, 1946).

In the treatment of established thrombophlebitis a combination of heparin and dicumarol is usual because of the delay in the action of the latter drug. As there is considerable individual variation in the response to either substance, it is necessary to keep a close watch on the "prothrombin time". Dicumarol has the advantage over heparin in that it may be given by mouth. It is an interesting drug which we owe to Link (1940) and his co-workers at the Wisconsin Experimental Station, having been derived from clover as a result of their investigations into the cause of hæmorrhagic disease of cattle produced by sweet clover.

*Ligation of arteries.*—We have re-learnt the importance of dividing a large artery which requires ligation and of cooling (not warming as so often practised in the past) a limb threatened by gangrene. We have also re-learnt the value of ligating the accompanying main vein unless the distal part of

the divided artery bleeds freely; of keeping a limb, the peripheral circulation of which is in jeopardy, not only cooled but elevated to heart level and of warming the body as a whole so as to relax the peripheral vessels. A large transfusion given rapidly to open the capillaries and increase the amount of circulating blood is also important. Gangrene may thus be averted by cooling the limb so as to reduce the demands upon its blood supply pending the development of a collateral circulation (Rogers, 1945).

*Varicose veins.*—It is interesting to notice the trend of thought regarding the treatment of varicose veins. Excision largely gave place to injection therapy which some fifteen years ago was highly popular. The limitations of injection therapy began to be realized, however, and became very apparent during the war. A combination of surgery with injection then appeared to be the method of choice, e.g. Trendelenburg's operation on the termination of the great saphenous vein with injection of its distal segment. The tendency to-day is to return to surgery, Trendelenburg's operation being combined with local extirpation of the varices, so that the wheel may be said to have turned a full circle.

#### THE ABDOMEN

*Intubation decompression.*—One of the outstanding advances in abdominal surgery is the increasing use of intubation decompression which constitutes an important surgical principle, the importance of which Wangenstein (1942) and his co-workers have done much to emphasize. The Miller-Abbot tube, first used in 1937, has established a place in surgical equipment. An inflatable balloon carries the tube onwards like a bolus so that the lower reaches of the intestine may be evacuated. A mercury weighted tube has been recently used for the same purpose (Cantor *et al.*, 1947).

*Gastrectomy.*—Whether transthoracic gastrectomy is a real advance remains to be seen. In the hands of masters such as Moynihan, Grey Turner and Gordon-Taylor, complete gastrectomy by the abdominal approach left nothing to be desired and Yudin's series of cases by this route constitutes an outstanding effort of modern Russian surgery (Gordon-Taylor, 1946). At the moment, however, many of the younger surgeons are filled with enthusiasm for the transthoracic operation and it is on trial.

*Vagotomy.*—From time to time vagotomy has been practised in the treatment of peptic ulcer. Secreto-motor impulses are transmitted by the vagi which thus constitute the pathway for the production of "psychic" secretion evoked by the sight or smell of appetizing food. Except in the case of the ulcer patient, gastric juice is not secreted during sleep. The increasing emphasis placed in recent years upon the part played by psychic factors in the pathogenesis of gastric and duodenal ulceration has led to a revival of vagal section (Dragstedt and Owens, 1943; Dragstedt, 1947). At the present time the operation is popular in parts of the United States (Weinstein, *et al.*, 1944) and is being tried in this country (Orr and Johnson, 1947). It is frequently combined with other procedures, such as gastro-enterostomy.

Results are inconclusive as yet and it remains to be seen whether the procedure becomes established as a surgical advance. Unless the pyloric end of the stomach is resected the hormonically induced flow of gastric acid remains after vagal section and, as Lahey (1947) points out, vagotomy only temporarily lowers acidity, so that if gastro-enterostomy is performed we may well wonder how many patients so treated will develop jejunal or anastomotic ulcers at a later date.

*Pancreatectomy.*—Perhaps the chief of the recent advances in abdominal surgery has been radical resection for malignant disease of the pancreas. Of late years a number of surgeons have reported successful results of duodeno-pancreatectomy, among whom may be noted Whipple (1942), Cattell (1945), Pannett (1946), Gordon-Taylor (1946), and others. Whereas most of the earlier operations were two-stage procedures, the tendency now is towards a one-stage operation.

*Portal obstruction.*—Recent attempts to relieve portal obstruction by portal-systemic anastomosis indicate some progress with this problem. Blakemore and Lord (1945) have successfully carried out anastomosis between the splenic vein and the left renal vein after removing the spleen and left kidney, and some encouraging results have been reported from this and other forms of anastomosis between the portal and systemic systems.

#### THE PROSTATE

Millin's (1945) operation has now been practised by various surgeons in different parts of the country. It has the advantage of being a dissection carried out under direct vision instead of a "blind sweep in the dark", and the post-operative comfort of the patient is sometimes striking when compared with the old Freyer operation or its modifications. Post-operative strictures have been reported, however, and few urologists have wholeheartedly adopted the extravesical operation. Its place in the surgery of the prostate has yet to be determined.

*Acid phosphatase test.*—A rise in the blood content of acid phosphatase has been shown to occur in *carcinoma of the prostate* (Gutman, 1942), and not only may this test be of value in diagnosis but also as an indication of the progress of the disease. Following stilbæstrol administration the acid phosphatase content of the blood falls.

#### THE NERVOUS SYSTEM

Here the chief recent advances are the use of water-tight fascia lata grafts to repair dural defects in the case of penetrating head injuries and the use of blood and fibrin derivatives, such as fibrin foam and fibrin gel; both for a similar purpose, i.e., to close meningeal defects and, in conjunction with thrombin, as hæmostatics. Leaking ventricular wounds, which in the war of 1914-18 were almost always fatal, have thus been successfully closed during

the recent war. The use of the fibrin substances is not confined to neurosurgery and already they are being applied in surgery generally to prevent leakage of intestinal anastomoses and in other ways. A strip of peritoneum moistened in thrombin can be anchored to a suture line swabbed with plasma, by applying gentle pressure for a few moments (Devine, 1946).

*Closure of bone defects.*—Bone defects in the skull, of which as might be expected there is a post-war spate, have been closed with acrylic resin mouldings, with sheet tantalum, and other foreign bodies. Celluloid and other materials were used after the 1914-18 war, but although claims are made for the inert character of the substances recently used, there can be no doubt that the correct material with which to close a hole in the skull is bone. This may be taken from an adjacent part of the skull as an outer table graft, from the wing of the ilium or as pieces of rib. No matter how successful a closure may be with a foreign substance, the patient always has the idea of "having a plate in his head" and thus becomes a somewhat morbid centre of interest, perhaps to himself, certainly to others. Bone on the other hand restores the skull to its original condition leaving no such liability to an *idée fixe*.

*The intervertebral disc.*—The frequency of intervertebral disc lesions and their responsibility for causing sciatica and brachial radiculitis are now widely recognized but fewer operations on discs are being performed as it is becoming realized that the removal of the disc is not always indicated, even in acute sciatica, and that other methods, e.g. rest, either medical or orthopaedic, i.e., in bed or in a jacket, or manipulation, are often effective in giving relief. The end-results of operation for rupture of intervertebral discs as seen in a recent analysis of a series of compensation cases collected throughout the United States leaves much to be desired (Aitken and Bradford, 1947). Only 13 per cent. of these patients are symptom free and capable of performing heavy laborious work, whilst 42 per cent. continue to have pain. As in so many things surgical, the pendulum having swung too far is gradually reducing its arc and we are realizing that in many cases good results can be obtained from conservative treatment which abolishes the irritation of the nerve root: operation is reserved for intractable and severe cases.

*Hyperpiesis.*—The great wave of enthusiasm for operations on the sympathetic system, at its height about 1934, has subsided as the indications and limitations have become better known. During a recent visit to America, however, I saw six different types of sympathectomy performed for hyperpiesis, the basis of each being splanchnicectomy with removal of varying lengths of the thoracic and lumbar chain of the sympathetic. Stability of opinion has not yet been reached as to the value of these operations or the best type of procedure. Some post-operative palliation of symptoms is seen in young subjects with malignant hypertension, but it is probably true to say that at the present time surgery has not really a great deal to offer to the patient who has the misfortune to suffer from hyperpiesis. Whether in time

to come an attack on the hypothalamus or some other intracerebral centre will solve this problem remains to be seen.

#### SURGERY IN MENTAL DISEASE

In the past decade a surgery of mental disease has sprung up. In 1936, Egas Moniz of Lisbon proposed an attack on the frontal lobes as treatment for various mental illnesses. At first he injected alcohol into the white matter but subsequently sectioned this instead. The operation, now known as *leucotomy*, has been widely performed for many and varied types of mental illness, and the Board of Control (1947) has recently published a report on 1000 patients treated by this procedure. The object of the operation is to produce a mild and sustained euphoria or to ease mental tension by breaking connexions between the frontal cortex and the thalamus. From the enthusiasm with which many psychiatrists have greeted the operation it would appear that they regard it as an advance on what they have been able to achieve by the more usual methods of treatment of mental patients, but there can be no doubt that the operation produces some irrevocable cerebral damage. This may be acceptable as a relief from mental pain, and in this respect the operation may be as justifiable for the pain of mental disease as is division of the spino-thalamic tracts in the spinal cord (chordotomy) for the relief of intractable physical pain. Both operations remind us, however, of what John Hunter said of operative surgery: "To perform an operation is to mutilate a patient we cannot cure; it should therefore be considered as an acknowledgment of the imperfection of our art".

The most satisfactory results have been seen in patients with obsessional melancholia, certain of whom as a result of the operation have been enabled to leave mental institutions and some even to carry on their occupations, but there can be no doubt that too many patients have been subjected to it with either no improvement or a further deterioration of their mental state. Leucotomy must be described as an empirical procedure worthy perhaps of application to certain carefully selected cases, but whether surgery for mental disease can be regarded as an advance must await future decision, and we may well ask with Macbeth whether we can yet "Raze out the written troubles of the brain".

#### THE THYROID

The outstanding event in thyroid surgery recently has been the introduction of the thiourca drugs; the latest to be used pre-operatively being propyl-thiouracil, which is considered to be less toxic than thiourea, thiouracil or methyl-thiouracil. With these drugs metabolism can be reduced to normal or even below normal, a state of affairs which is not possible with iodine alone; hence any liability for a post-operative flare reaction to occur in a case of acute thyrotoxicosis can be completely abolished.

The patient prepared for operation with a thiourea preparation alone has a very vascular gland, and a combination with iodine is therefore found to be preferable, iodine being given only after propyl-thiouracil has been administered for some time (Lahey, 1946). The thiourea drugs should not be given in adenomatous goitre, since not only may they induce metaplasia, but they are also liable to produce an increase in the size of the gland which may embarrass respiration. For the pre-operative preparation of the rare patient who is unable to tolerate iodine these drugs are particularly valuable and until their introduction there was no substitute for iodine in such cases. Their use in any case of thyrotoxicosis is not without danger, however, as agranulocytosis and other toxic manifestations have been recorded.

The greatest advance in thyroid surgery in recent times is its increased safety. The mortality of goitre operations in the leading clinics to-day is no higher than that for operations for inguinal hernia. Subtotal thyroidectomy remains the most effective treatment of thyrotoxicosis and is indicated for most cases of the disease.

#### THE THYMUS

Thymectomy for myasthenia gravis has been well tried in the able hands of Geoffrey Keynes (1946). The incidence of this disease in cases of thymic tumour is greater than is the incidence of thymic tumour in cases of myasthenia, so that the relationship of the thymus to the condition is not yet clearly established. The results of operation "are somewhat erratic", the best being obtained in young patients with long histories, but since spontaneous remissions occur in the disease, and since prostigmin is almost invariably given with much benefit to most sufferers, it is difficult to determine the precise place which thymectomy may play.

#### DUPUYTREN'S CONTRACTURE

There is recent evidence that the condition is hereditary and not, as believed by Dupuytren, an occupational lesion; thus it more often begins in the left hand, frequently occurs in those who have never done any manual labour, and is sometimes seen in the plantar fascia (Corlette, 1944). It has been recorded in identical twins in whom it occurred at the same age (Crouch, 1938), a further point in favour of its being a familial condition. Recent demonstrations by Steinberg (1946) that the condition may be made to resolve under the influence of large doses of vitamin E is a somewhat striking innovation which if verified will prove a blessing to sufferers, since the results of either conservative or operative treatment are on the whole disappointing.

#### OSTEOARTHRITIS OF THE HIP

Different forms of arthroplasty are being given a trial, the intervening material being either a vitallium cup or one made of one of the plastic compounds, such as the methacrylic resins (Harmon, 1943). The vitallium



cup was first used by Hopkins and Zuck (1938) and brought into prominence by Smith-Petersen (1939). Complete relief from pain is claimed in at least half the patients who are cupped, and the later results of the procedure are favourably reported on by some orthopædic surgeons.

#### POST-OPERATIVE RESTORATION OF FUNCTION REHABILITATION

Perhaps one of the most outstanding features of surgical practice in recent years has been the importance attached to the post-operative restoration of the injured. Rehabilitation, an expression once rarely heard, became a household word during the war years and centres for rehabilitation sprang up in various parts of the country. One example will indicate the change in procedure which such centres have brought about.

A miner with a torn semilunar cartilage might have it successfully removed but owing to wasting of his quadriceps be many weeks or months before being fit for full work. Rehabilitation consists in restoring the function of the quadriceps extensor muscle as soon as possible so as to facilitate early return to duty. In such a case rehabilitation takes the form of appropriate exercises and organized games, the object of which is quadriceps development.

It will be readily apparent that organized post-operative treatment directed to early restoration of function has a wide field and is as applicable to patients with head or spinal injuries as to the example quoted.

#### CONCLUSION

It has been possible to touch on only certain of the apparent advances in surgery in the last decade and some of the trends at the present time. Not the least of these perhaps have not been mentioned and may be the discarding of certain shibboleths such as the Fowler position (Spalding, 1946; Ogilvie, 1946; Atkins, 1947), elaborate nursing preparation for operation, undue confinement to bed afterwards and the frequency of dressings, whilst in addition to the innovations here mentioned, the employment of new materials such as the plastics, vitallium, tantalum and stainless steel and a more rational conception of the avoidance of wound infection, have played their part. Neither must the recent improvements in anæsthesia and the development of team work, which contribute so much to the success of modern operative surgery, be overlooked.

With increasing knowledge of the cause of congenital defects, since Gregg's (1941) important work in Australia first drew attention to the association between congenital cataract and an attack of rubella in the mother early in pregnancy, it is possible that many congenital disabilities may be prevented and with their abolition the surgery of their repair will disappear.

Changes are taking place continually, no matter how insidiously, and we shall be wise not to lose sight of the fact and to avoid that complacency which would assume that something like finality has been reached in anything relating to medicine. Even with surgical technique it is well to adopt

the outlook of the late Mr. Henry Ford: "that everything can always be done better than it is being done". Advances in medicine, using the term in its broad sense, must ultimately lead to the disappearance of surgery, except for the treatment of injuries, to which mankind presumably will always be liable, for it is possible to visualize a time when surgery will neither be required in the treatment of disease nor for the repair of congenital defects, since both should ultimately be avoidable in an enlightened community, when that day of Isaiah (XIII, 12) shall have come and a man's life shall "be more precious than fine gold".

"What though we perish ere the day is won?  
Enough to see its glorious work begun!  
The thistle falls before a trampling clown,  
But who can chain the flying thistle-down?"

### References

- Aitken, A. P., and Bradford, C. H. (1947): *Amer. J. Surg.*, 73, 365.  
 Atkins, H. (1947): *The Practitioner*, 159, 87.  
 Bauer, G. (1946): *Lancet*, i, 447.  
 Blakemore, A. H., and Lord, J. W. (1945): *J. Amer. med. Ass.*, 127, 748.  
 Board of Control (1947): "Prefrontal Leucotomy," H.M. Stationery Office.  
 Cantor, M. O., Kennedy, C. S., and Reynolds, R. P. (1947): *Amer. J. Surg.*, 73, 437.  
 Cattell, R. B. (1945): *New Engl. J. Med.*, 232, 521.  
 Corlette, C. E. (1944): *Med. J. Austral.*, 2, 177.  
 Crouch, M. (1938): *Canad. med. Ass. J.*, 39, 225.  
 Devine, J. (1946): *Surg. Gynec. Obstet.*, 82, 475.  
 Dragstedt, L. R. (1947): *Canad. med. Ass. J.*, 56, 133.  
 —, and Owens, F. M. (1943): *Proc. Soc. exp. Biol.*, 53, 152.  
 Gordon-Taylor, G. (1946): Personal communication.  
 Gregg, N. M. (1941): *Trans. Ophthalm. Soc. Austral.*, 3, 35.  
 Gutman, A. B. (1942): *J. Amer. med. Ass.*, 120, 1112.  
 Harmon, P. H. (1943): *Surg. Gynec. Obstet.*, 76, 347.  
 Hopkins, H. H., and Zuck, F. N. (1938): *M. Bull. vet. Admin.*, 15, 1.  
 Keynes, G. (1946): *Proc. roy. Soc. Med.*, 39, 600.  
 — (1946): *Brit. J. Surg.*, 33, 201.  
 Lahey, F. H. (1946): Personal communication.  
 — (1947): *J. Amer. med. Ass.*, 134, 574.  
 Link, K. P. (1940): *J. biol. Chem.*, 136, 47.  
 Millin, T. (1945): *Lancet*, ii, 693.  
 Moniz, E. (1936): "Tentatives opératoires dans le traitement de certaines Psychoses," Paris.  
 Ogilvie, W. H. (1945): *Jour. R. Army med. Cps.*, 85, 259.  
 — (1945): *Brit. med. J.*, i, 619.  
 — (1946): *Lancet*, i, 715.  
 Orr, I. M., and Johnson, H. D. (1947): *Ibid.*, ii, 84.  
 Pannett, C. A. (1946): Personal communication.  
 Rogers, Lambert (1938): *The Practitioner*, 141, 372.  
 — (1945): *Med. J. Austral.*, 1, 517.  
 Smith-Petersen, M. W. (1939): *J. Bone Jt. Surg.*, 21, 269.  
 Spalding, J. E. (1946): *Lancet*, i, 643.  
 Steinberg, C. L. (1946): *Med. Clin. N.A.*, 30, 221.  
 Wangenstein, O. H. (1942): "Intestinal Obstructions," 2nd edition, Springfield.  
 Weinstein, V. A., et al. (1944): *Surg. Gynec. Obstet.*, 79, 297.  
 Whipple, A. O. (1942): *New Engl. J. Med.*, 226, 515.

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ent. This increased incidence has been confirmed by Sharman. The importance of these figures lies in the fact that most of the patients presented no abnormal gynæcological symptom or sign, confirms the characteristic latent nature of genital tuberculosis in

question of treatment in endometrial tuberculosis is often difficult but it can be said to rest between treatment of the general health, local interference, and radical surgical treatment. Such local treatments as tests for tubal patency, curetting and salpingostomy should be avoided, as they can only help to disseminate the disease.

#### RELIEF OF PAIN IN LABOUR

*line hydrochloride* (also known as "demerol", "dolantal" or "dolantin") has been used fairly widely as an analgesic during labour. It is given in doses of 50 mgm. intramuscularly and can be repeated up to a total dosage of 300 mgm. in twenty-four hours, although most obstetricians use a smaller dose of 50 mgm. after the first administration. Oral administration is less successful than intramuscular injection.

Pethidine can be used in the first or second stages of labour, and under its influence it is claimed that the lower uterine segment dilates more quickly. It does not inhibit uterine action as does morphine, and it has a less pressant action on the child's respiratory centre. Enthusiastic reports have been published (Carter, 1945) on the use of pethidine, 100 mgm, with atropine  $\frac{1}{100}$  grain (0.43 mgm.), in a series of 2,700 patients in whom it is claimed that analgesia was produced in fifteen to twenty minutes and lasted for two to three hours. It is stated that labour advances more rapidly than usual owing to the production of relaxation and therefore more rapid dilatation of the lower uterine segment, that there are no contraindications to their use and that they do not depress the child's respiratory centre. From my own experience I regard pethidine as a reliable analgesic, producing no complications in the mother and with a minimal effect on the child's respiratory centre. Cases of addiction to the drug have been reported but naturally none of them have followed labour.

*Caudal anæsthesia.*—Extradural spinal block is a method of obtaining regional anæsthesia by injecting an anæsthetic solution into the epidural or subdural space. It was first introduced in 1921 by Pages of Barcelona. It was little used in obstetrics until Hingson and Edwards (1943) published their technique of continuous caudal analgesia. The word "continuous" is not strictly accurate as the method consists in passing a special malleable needle into the sacral canal and leaving it there for several hours and injecting a certain amount of fluid from time to time. Favourable reports on the use of caudal analgesia in this country have been made by Poole (1941), and by Galley and Peel (1944).

# ADVANCES IN OBSTETRICS AND GYNÆCOLOGY

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## INFERTILITY

*Body temperature and ovarian function.*—Much work has been done recently on the subject of infertility which has established the alteration in the body temperature at different times in the menstrual cycle depending upon ovarian function. It has been shown (Palmer and Mocquot, 1940) that oestrogens lower the body temperature and that progesterone raises it. As a result, the temperature is lower in the follicular phase and higher during the luteal phase, but only during ovulatory and not during anovular cycles. The luteal phase (and therefore the raised temperature) will continue during pregnancy as a result of the activity of chorionic gonadotrophin. Many observers have confirmed these findings, and if the temperature be taken daily on waking it will produce a dihasic record in each menstrual cycle. That is to say that during the oestrogen phase of the cycle the temperature is anything from  $0.5^{\circ}$  to  $0.9^{\circ}$  F. lower than during the progesterone phase. The rise in temperature occurs immediately after ovulation and in the woman who does not become pregnant persists for twelve to sixteen days. The temperature chart can be used as an index of ovulation and is therefore useful in the following ways:—

(1) In giving advice as to the time of maximum fertility; as a method of avoiding the time when pregnancy is most likely to occur in those who do not wish to use contraceptives.

(2) For the purpose of timing endometrial biopsy and artificial insemination.

(3) As a means of observing the effect of treatment in producing ovulation.

It can also be used (a) to diagnose pregnancy with a moderate degree of reliability; (b) as evidence of intra-uterine death in early pregnancy.

The temperature chart does not show ovulation time in 100 per cent. of women and there are more reliable tests of pregnancy. The waking temperature is, however, a simple investigation which the patient can make and record for herself, and is reliable in a sufficiently large proportion of women to justify its wide application in the field of infertility.

*Tuberculosis as a cause of blocked tubes.*—The improved methods of investigating infertility have resulted in a recognition of the increased incidence of pelvic tuberculosis as a cause of the condition. Halbrecht (1946) found tuberculous endometritis in 45 out of 820 women investigated, i.e.,

becomes complicated by pregnancy. In the last year or two several writers have made suggestions some of which seem worthy of adoption.

Jacobs (1946) recommends the following principles:—Therapeutic abortion is of little help and should never be carried out after the third month. Treatment of the lung disease must be vigorous before and after delivery. Skilled obstetric care must be provided. The child should be separated from its mother from birth. Domestic and financial help in the home should be available for all these patients.

Calow (1946) and Dixon Hughes (1946), both of Sydney, agree with the above but recommend that the State should provide special sanatoria for housing these patients throughout pregnancy and for at least three months after delivery.

Dawson (1945) found radiological evidence of the disease in 30 of 1000 women whose chests were examined between the 30th and 36th week. He found active disease in 0.6 per cent. and inactive disease in 2.4 per cent., figures which closely approximate to those of other observers.

Meixner (1945) agrees that abortion should never be carried out after the third month but believes it to be of value in patients with active lesions.

Practical conclusions which can be drawn from these articles are:—First, that all women on their first antenatal visit should have an X-ray examination of their chests, just as in modern antenatal clinics other routine examinations are made early in pregnancy, i.e. blood count, Wasserman test and determination of Rh factor. Secondly, that improved results are obtained by surgical treatment, such as pneumothorax or thoracoplasty, procedures that are not contraindicated by pregnancy. Finally, that therapeutic abortion has a small place in treatment and should never be done later than the twelfth week.

#### DIAGNOSIS OF UTERINE CANCER

The suggestion that carcinoma involving either the body or cervix of the uterus may be diagnosed by a vaginal smear depends upon the fact that malignant growths of the uterine body, cervix and vagina desquamate cells from their surface which can be seen in a smear of the vaginal secretion (Papanicolaou, 1945). The cells become detached either singly or in clusters; the presence in the smear of cell clusters indicates exfoliation. Some of the clusters retain structural characteristics of the growth from which they have desquamated, thereby aiding the diagnosis considerably. Cervical smears have been recommended (Ayre, 1946) as showing malignant cells more readily than a vaginal smear, and in 100 cases giving a tissue diagnosis of malignancy the error was 6 per cent. only.

The value of this method lies in the fact that a smear diagnosis of malignancy may be made before the growth has caused any symptom. A positive smear should always be followed by curetting and/or biopsy. The smear technique will also rule out a diagnosis of malignant disease in innocent conditions that clinically simulate malignancy. The method of obtaining a vaginal smear is unusually simple.

A sample of vaginal secretion is obtained by means of a glass pipette and with no more inconvenience to the patient than that produced by passing a speculum.

The aim of this method is to produce a regional block of the nerves supplying the uterus by the injection of a cocaine derivative into the epidural space *via* the sacral canal. The motor nerve supply of the upper uterine segment arises above the tenth dorsal segment, so that a spinal block up to and including the tenth dorsal will not interfere with contractions of the upper uterine segment; whilst the sensory fibres to the uterus and both sensory and motor fibres to the lower uterine segment, cervix, pelvic floor and perineum arise from below the tenth dorsal and are affected by the injection, so that all painful sensations connected with labour will be removed.

One-and-a-half per cent. metycaine in isotonic saline is most commonly used. Considerable skill and experience are necessary in passing the needle into the sacral hiatus, on into the sacral canal and in judging the distance and direction to which the point has reached. Should cerebrospinal fluid escape or be aspirated, no further attempt at this method of anaesthesia should be made as injection in such a case would result in a spinal anaesthetic being given. The needle may also enter a blood sinus which necessitates a change in the position of the needle point. The injection of 8 c.cm. of metycaine is now made and an interval of ten minutes allowed to elapse in order to be sure that spinal anaesthesia has not developed. If there is no evidence of this a further 22 c.cm. is injected and the subsequent doses given as necessary. The rate of dose is usually 20 c.cm. every half hour.

In a successful case, and in the hands of an expert the majority of cases are successful, the uterine contractions can only be appreciated by placing a hand on the uterus. The patient is usually unconscious of the contractions, and cutaneous anaesthesia spreads up to the level of the umbilicus. In the second stage the voluntary expulsive efforts of the patient are lost and this undoubtedly increases the forceps rate in primigravidae. Spontaneous rotation of the occiput from the posterior positions is less likely to occur. The third stage is shorter and the amount of bleeding from the placental site and perineal tears is less than normal. Opinions are divided about the condition of the child at birth and it has been suggested that a state of anoxaemia exists in a fair proportion of these babies. Caudal anaesthesia has been employed for Caesarean section with complete success in a considerable number of patients.

The value of a method such as this is obvious in that it obliterates the pain of labour without danger to the mother and child and without exposing either to the unpleasant and at times dangerous effects of inhalation anaesthesia. The very considerable difficulties which surround the technique, the amount of time which has to be given to carrying it out, and the fact that it should never be carried out except in an institution, make it impossible of wide application. Nevertheless, the method can be of great value in women to whom an inhalation anaesthetic is likely to prove dangerous.

#### PULMONARY TUBERCULOSIS AND PREGNANCY

Both chest physicians and obstetricians have long held widely divergent views on the treatment of the woman with pulmonary tuberculosis which

becomes complicated by pregnancy. In the last year or two several writers have made suggestions some of which seem worthy of adoption.

Jacobs (1946) recommends the following principles:—Therapeutic abortion is of little help and should never be carried out after the third month. Treatment of the lung disease must be vigorous before and after delivery. Skilled obstetric care must be provided. The child should be separated from its mother from birth. Domestic and financial help in the home should be available for all these patients.

Calow (1946) and Dixon Hughes (1946), both of Sydney, agree with the above but recommend that the State should provide special sanatoria for housing these patients throughout pregnancy and for at least three months after delivery.

Dawson (1945) found radiological evidence of the disease in 30 of 1000 women whose chests were examined between the 30th and 36th week. He found active disease in 0.6 per cent. and inactive disease in 2.4 per cent., figures which closely approximate to those of other observers.

Meixner (1945) agrees that abortion should never be carried out after the third month but believes it to be of value in patients with active lesions.

Practical conclusions which can be drawn from these articles are:—First, that all women on their first antenatal visit should have an X-ray examination of their chests, just as in modern antenatal clinics other routine examinations are made early in pregnancy, i.e. blood count, Wasserman test and determination of Rh factor. Secondly, that improved results are obtained by surgical treatment, such as pneumothorax or thoracoplasty, procedures that are not contraindicated by pregnancy. Finally, that therapeutic abortion has a small place in treatment and should never be done later than the twelfth week.

#### DIAGNOSIS OF UTERINE CANCER

The suggestion that carcinoma involving either the body or cervix of the uterus may be diagnosed by a vaginal smear depends upon the fact that malignant growths of the uterine body, cervix and vagina desquamate cells from their surface which can be seen in a smear of the vaginal secretion (Papanicolaou, 1945). The cells become detached either singly or in clusters; the presence in the smear of cell clusters indicates exfoliation. Some of the clusters retain structural characteristics of the growth from which they have desquamated, thereby aiding the diagnosis considerably. Cervical smears have been recommended (Ayre, 1946) as showing malignant cells more readily than a vaginal smear, and in 100 cases giving a tissue diagnosis of malignancy the error was 6 per cent. only.

The value of this method lies in the fact that a smear diagnosis of malignancy may be made before the growth has caused any symptom. A positive smear should always be followed by curetting and/or biopsy. The smear technique will also rule out a diagnosis of malignant disease in innocent conditions that clinically simulate malignancy. The method of obtaining a vaginal smear is unusually simple.

A sample of vaginal secretion is obtained by means of a glass pipette and with no more inconvenience to the patient than that produced by passing a speculum.



It can be done in any out-patient department or consulting room. The material is spread on a slide and fixed in a mixture of equal parts of 95 per cent. alcohol and ether. Fixation and staining require about twenty minutes. The simplicity of the technique does not imply that the interpretation of the smear is equally simple and can be mastered in a short time.

It is necessary to have the smears examined by a pathologist familiar with the method, and in America many institutions have established departments entirely for the examination of vaginal and cervical smears. Indeed, a suggestion has been made that every large city should have one such department to which all those within its radius who take smears can send them for diagnosis. This method has as yet not been carried out to any extent in the British Isles, and so far as I am aware the only centre at present using it is in Edinburgh, where Professor R. J. Kellar has introduced it.

Earlier in this review it was stated that the smear method enabled carcinoma of the uterus to be diagnosed when the patient had no gynaecological symptom. Why then are these examinations undertaken? In America (Webster *et al.*, 1946) the habit of regular examination of healthy women is much more established as an ordinary medical practice than in this country. A wide educational campaign recommending all healthy people to be examined once or twice a year is needed. There is little doubt that this type of investigation is becoming more popular, but it is a long step to the regular six-monthly examination of all women. It is a debatable point whether teaching patients who feel quite well to visit a doctor or clinic for routine examination, say twice a year, would make them psychoneurotic in a short time.

### References

- Ayre, J. E. (1946): *Amer. J. Obstet. Gynec.*, 51, 743.  
 Calow, W. L. (1946): *Med. J. Austral.*, 2, 224.  
 Carter, H. M. (1945): *Wisconsin med. J.*, 44, 1170.  
 Dawson, J. B. (1945): *N.Z. med. J.*, 44, 312.  
 Galley, A. H., and Peel, J. H. (1944): *Proc. roy. Soc. Med.*, 37, 680.  
 Halbrecht, I. (1946): *Schweiz. med. Wschr.*, 67, 708.  
 Hingson, R. A., and Edwards, W. B. (1943): *J. Amer. med. Ass.*, 121, 225.  
 —, — (1943): *Anæsthesiology*, 4, 181.  
 Hughes, T. Dixon (1946): *Ibid.*, 2, 230.  
 Jacobs, A. L. (1946): *J. Obstet. Gynec.*, 53, 368.  
 Meixner, F. M. F. (1945): *Dis. Chest*, 11, 409.  
 Pages, F. (1921): *Rev. Sanid. Mil., Lima*, 11, 351.  
 Palmer, R., and Devillers, J. (1939): *C. R. Soc. Biol., Paris*, 130, 895.  
 —, — (1939): *C. R. Soc. franç. Obstét. Gynec.*, 9, 66.  
 —, and Mocquot, P. (1940): *Presse Méd.*, 48, 305.  
 Papanicolaou, G. N. (1945): *N. Y. St. med. J.*, 45, 1336.  
 Poole, W. H. (1941): *J. Obstet. Gynec.*, 48, 1.  
 Sharman, A. (1945): *Glasgow med. J.*, 143, 77.  
 Webster, A., *et al.* (1946): *Illinois med. J.*, 89, 239.

# ADVANCES IN PÆDIATRICS

BY RONALD S. ILLINGWORTH, M.D., F.R.C.P., D.P.H., D.C.H.

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MANY new lines of treatment described in medical journals have appeared to represent considerable therapeutic advances, only to be shown in time to be of very limited or of no value. The use of glyeine and vitamin E in myopathies, of hormone preparations for undescended testicles, of anti-serum in poliomyelitis, of whooping-cough vaccine in the treatment of whooping-cough, of phenothiazine in threadworm infestation, of concentrated serum and various drugs in the nephrotic syndrome, of vitamin K administered to the mother before delivery to prevent cerebral hæmorrhage in the newborn, may all be cited as examples. Many other new drugs are being used extensively, but are of unproven value and may be quite valueless. As examples may be cited the use of prostigmin in spastic children, vitamin preparations in pink disease, sulphaguanidine in infantile gastro-enteritis, folic acid in cœlic disease, pituitary preparations in the treatment of dwarfism, and sulphonamides in the treatment of acute tonsillitis.

There have been no important recent advances in the treatment of enuresis, virus diseases (e.g. colds, poliomyelitis, measles, smallpox, chickenpox, rubella, virus pneumonia), and many other pressing problems in children, and probably none in the treatment of asthma. There has been no recent advance in the prevention of colds and coughs in children, of asthma, antrum infections and other common conditions which form such a large part of pædiatric practice. It is not easy therefore to describe many recent advances in pædiatric therapeutics which are of value and which will remain of value. Some of the drugs mentioned below are by no means new, but it was thought worth while to remind practitioners of their value. Certain advances in surgical treatment are described briefly, not because they are available in this country, but because they do offer hope for the future when pædiatric surgery has become as much a speciality in England as it has rightly done in the United States.

## LACTATION

Every practitioner who is responsible for the care of new-born babies should be conversant with Waller's work, and in particular with his book "Clinical Studies in Lactation". In order to secure proper breast feeding he prepares the mother in the last few weeks of pregnancy. If the nipples are inverted or retracted he advocates a glass shield, with the nipple lying under the circular opening in the shield, which is worn under a closely-fitting brassière. This exerts a continuous painless pressure which pushes

It can be done in any out-patient department or consulting room. The material is spread on a slide and fixed in a mixture of equal parts of 95 per cent. alcohol and ether. Fixation and staining require about twenty minutes. The simplicity of the technique does not imply that the interpretation of the smear is equally simple and can be mastered in a short time.

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 ———, ——— (1943): *Anæsthesiology*, 4, 181.  
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 ———, ——— (1939): *C. R. Soc. franç. Obstét. Gynec.*, 9, 66.  
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normal is very necessary for the diagnosis and management of the abnormal, and every practitioner who deals with children should be conversant with Gesell's work.

#### TREATMENT OF EPILEPSY

*Tridione* has proved to be the drug of choice for *petit mal*. The dose in an infant is one capsule (0.3 gm.), 2 capsules at the age of two to four years, and 3 capsules at five years. The drug has stopped or reduced the frequency of the attacks when all other drugs have failed. It should not be used in *grand mal*. Unfortunately the drug has certain toxic actions, the most important of which is granulopenia. Lennox (1947) reported that in 6 per cent of 127 patients the neutrophil count dropped to 1,600 or less per c.mm. The white cell count returned to normal when the drug was stopped. It is therefore essential when giving the drug to perform weekly white cell counts. Aplastic anæmia is a very rare complication. The most common complications, however, are ocular—photophobia, glare, yellow vision, an appearance as if objects are covered with snow, and night-blindness are common—some visual disturbances occurring in almost 75 per cent. of adults receiving the drug, but no damage is done to the eye. Other complications are rashes, drowsiness, fever, diarrhœa, vomiting, and an initial aggravation of *petit mal* attacks.

For *grand mal*, epanutin (dilantin) remains the drug of choice if phenobarbitone in adequate dosage fails to control the fits. The average daily dose over the age of six is 2 to 4 capsules (0.1 gm. per capsule), before food. The drug may cause gingivitis, rashes, ataxia, tremors, amblyopia and gastric discomfort. It should not be regarded as having failed until the limit of tolerance has been reached. It may profitably be combined with phenobarbitone,  $\frac{1}{2}$  grain (32 mgm.) per dose.

For a combination of *grand* and *petit mal*, the best treatment is tridione with phenobarbitone. Epanutin may also be tried with tridione for the purpose.

#### THE SO-CALLED ANTIHISTAMINE DRUGS

The exact mode of action of these drugs—antergan, pyribenzamine and benadryl—is not yet certain. They may prove to be antispasmodic rather than antihistaminic in action.

*Benadryl*, in a dose of 2 mgm. per lb. body weight, is very effective in relieving urticaria. It is of some use in hay fever in children and in food allergy, but has proved disappointing in eczema and asthma. Unfortunately it has numerous toxic reactions, though severe ones are rare. Drowsiness is a common complication. It may also rarely cause vertigo, dryness of the mouth, cacogeusia, loss of judgment, confusion or jittery feeling, diplopia, ataxia, twitchings, shock-like reactions, vasospasm, facial œdema, stupor, amblyopia, palpitation, melancholia, lowering of the blood pressure, and depression of the white cells. *Pyribenzamine* in similar dosage may be used

the nipple through the opening. He also advocates the routine manual expression of colostrum in the last few weeks.

In a series of 100 women who were taught to express the colostrum daily in this way, 83 were successfully breast feeding their infants at the age of six months, as against 42 of the controls who did not express it. In the treated group there was half the incidence of sore nipples, a much lower incidence of engorgement of the breasts, a freer outflow of milk, and the babies showed a greater gain in weight because of greater milk intake.

He emphasizes the extreme importance of prompt treatment of the *engorged breast*. He shows that the difficulty is not shortage of milk, but of difficulty in its outflow. Manual expression is tried in the early mild case, but in the severe case this may be too painful at first, and a single dose of stilbæstrol, 1 mgm. (repeated in larger doses if necessary, remembering that if used to excess it will entirely inhibit lactation), will usually permit of manual expression, and in a day or two the baby can be put back to the breast. For any breach of the surface of the nipple, however slight, he advocates removal of the infant from the breast and manual expression of the milk. He uses 1 per cent. yellow mercuric oxide ointment as a protective covering in the lying-in period and as a healing agent. Penicillin cream is also of value. When the baby is returned to the breast, care must be taken to see that the jaws are placed well behind the nipple and that the baby does not suck the nipple.

He emphasizes the temporary nature of the falling off in lactation when the mother gets up on about the tenth day. It is at this time that the serious mistake of putting the baby entirely on to artificial feeding is most often made. The flow of milk returns in a day or two in the great majority if every effort is made to keep the baby on the breast, using each breast for every feed.

On this régime, of 300 primiparæ, 79 per cent. were breast feeding their baby successfully at the age of six months. Enid Hughes (1942), as a contrast, states that in a small mining town in Northumberland 57 per cent. of 112 babies were weaned by three months. Of 100 consecutive babies attending the "well-baby clinic" at the Sheffield Children's Hospital in 1947, 64 per cent. were breast fed for less than two months.

#### NORMAL DEVELOPMENT OF THE INFANT AND CHILD

In my opinion the most fundamental and important pædiatric research of recent years is that of Arnold Gesell (1941, 1942, 1945) at Yale, on the normal development of infants and children. Over a period of many years, under the auspices of the Rockefeller Foundation, Gesell has studied and recorded the development of feeding behaviour, of the use of the eyes, of the ears, of the trunk, arm and leg muscles, of speech and social behaviour in normal children. He analysed them by the use of the cinematograph, and applied his findings to ordinary pædiatric practice. A thorough knowledge of the

normal is very necessary for the diagnosis and management of the abnormal, and every practitioner who deals with children should be conversant with Gesell's work.

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for urticaria. It may cause diarrhœa and vomiting, dysuria, headache and drowsiness. Neither of the drugs is a cure for allergic conditions, nor do they give anything more than temporary relief.

#### MUMPS

It is now thought that atrophy of the testis following orchitis is due not to the orchitis but to an acute hydrocele. Nixon (1946) operated on 68 cases in soldiers: the tunica vaginalis was exposed and incised. The hydrocele fluid usually drained out under considerable pressure. A small Penrose drain was inserted beneath the tunica vaginalis and the wound was closed. This promptly relieved pain, nausea, vomiting, backache and fever, shortened the period of disability, and prevented atrophy of the testis.

Enders (1946) reports promising experimental work in the prevention of mumps in man by vaccination with formalized mumps virus (see also *The Practitioner*, Sept., 1947, 159, 200).

#### RHEUMATIC FEVER

The rôle of *salicylates* in rheumatic fever is still much in dispute. Few can deny that when given in proper dosage [ $1\frac{1}{2}$  grains (0.1 gm.) per lb. body weight per day] they rapidly relieve the painful swelling of joints. They seem to have no effect on the proliferative reaction in the heart (the valvulitis) but they may affect the exudative reaction (pericarditis). They should be used for acute rheumatic carditis. On account of their toxicity they should not be given intravenously.

Much has been written about the toxic actions of salicylates. These may be divided into 5 main groups: (1) Action on the respiratory centre, causing hyperventilation. This causes alkalosis in the first place followed by ketosis. (2) General toxic symptoms, i.e. tinnitus, vertigo, deafness. (3) Action on the gastric mucosa, acute ulceration and irritation. (4) Allergic—asthma, œdema, rashes. (5) Hæmorrhagic—by causing hypoprothrombinæmia: purpura, hæmatemesis, melæna and epistaxis. The only virtue of combining sodium bicarbonate with sodium salicylate is that it may reduce the gastric irritation. It does nothing to prevent acidosis.

Taran (1947) draws attention to the great value of *oxygen* in acute carditis of recent onset. Poulton had recommended this treatment many years before. Taran says that it causes an immediate drop in temperature and pulse rate with unequivocal improvement in the cardiac reserve, and dramatic removal of all subjective and objective signs of cardiac insufficiency. It does not shorten the course of rheumatic activity.

It cannot be emphasized too strongly that two common conditions, which bear no relationship to rheumatic fever, are still treated by many as acute rheumatism with consequent totally unnecessary limitation of the activity of the child. One is growing pains, in which the pains are not articular but muscular, and the other is nervous tachycardia, in which the

sleeping pulse is normal and there is no evidence of rheumatic activity. Such children should on no account be kept in bed or treated as invalids.

#### TREATMENT OF THREADWORMS

If threadworms are not causing any disturbance in the child's general health and have only been noted by the mother on occasions, no treatment is required. For other cases gentian violet remains the best drug, in a dose of  $\frac{1}{8}$  grain (11 mgm.) per year of age per day, in enteric-coated capsules. The drug is given for a course of eight days, followed by a seven-day rest period, and a second course of eight days. At night, dilute ammoniated mercury ointment is smeared around the anus, and the finger nails are kept short and clean. It is essential to treat other affected members of the family at the same time, including the mother. By far the most common cause of failure of the treatment is an untreated infection in a sibling or parent. The drug not infrequently causes diarrhoea, which in a few cases may necessitate its withdrawal.

#### ANTIBIOTICS AND CHEMOTHERAPY

*Influenzal meningitis.*—The treatment of choice is sulphadiazine (intravenously or subcutaneously, in 5 per cent. solution), and Alexander's rabbit antiserum. Alexander (1946) reports recovery in 80 of 90 cases so treated. In another paper she says that streptomycin, given intramuscularly and intrathecally, is satisfactory when given alone in mild or moderate cases, but not in severe cases. In this country if neither Alexander's serum nor streptomycin is available, sulphadiazine by mouth or parenterally should be combined with intramuscular and intrathecal penicillin.

*Pneumococcal meningitis.*—The treatment should be sulphadiazine and penicillin. The penicillin is given intramuscularly, and although there is a difference of opinion as to whether it should also be given intrathecally, it should probably be given by this route as well. If it is so used, the solution should not be stronger than 1000 units per c.cm., and the total dosage by this route should not exceed 10,000 to 20,000 units per day. Cerebrospinal fluid is first withdrawn and mixed with the penicillin to dilute it. Intrathecal penicillin may cause flaccid paraplegia, radiculitis and cauda equina lesions.

*Cerebrospinal meningitis* is best treated by sulphadiazine alone. The average dose is 2 to 3 grains (0.13 to 0.2 gm.) per lb. body weight per day.

*Tuberculous meningitis.*—Experiments are being carried out in this country on the effect of streptomycin on this condition. The results of the investigation are encouraging. Results reported from America have not been very encouraging, the few survivors usually having severe sequelæ, such as mental defect, blindness, deafness and ataxia.

*Congenital syphilis.*—Platou (1947) recommends a dosage of 4000 units of penicillin per lb. body weight per day, for fifteen days. He emphasizes that deaths are far more commonly due to secondary infection, malnutrition,



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and associated socio-economic hazards than to syphilis, and therefore more immediate regard must be given to the general condition of the patient than to the spirochæte. He reported satisfactory results in 73 per cent. of 252 infants treated by him. The Wassermann reaction may not become negative for a year or more after the end of treatment, but the titre should gradually fall if treatment has been adequate.

*Bacterial endocarditis.*—A total of 100 cases is described in four American series, with 87 recoveries. The dosage of penicillin must be adjusted to the sensitivity of the organism, so that full hospital and laboratory facilities are necessary. The average total daily dose is 800,000 to 900,000 units, given intramuscularly two-hourly for at least a month. Larger doses must be given for resistant organisms.

*The solubility of sulphonamide drugs.*—Lehr (1946) showed that when a combination of three sulphonamide drugs was used simultaneously, the solubility was greatly increased, the concentration of the three drugs in saturated solution representing the sum total of their individual solubilities. Therefore when sulphonamide crystalluria occurs or is especially feared, in spite of proper alkalization of the urine, the likelihood of calculus formation and colic is considerably reduced by prescribing a mixture of three sulphonamides (e.g.  $\frac{1}{3}$  of sulphathiazole,  $\frac{1}{3}$  of sulphadiazine,  $\frac{1}{3}$  of sulphamezathine).

## PÆDIATRIC SURGERY

Great strides have been made in pædiatric surgery in America.

### VASCULAR SURGERY

*Ligation of a patent ductus arteriosus* now carries a very low operative mortality. This operation, and also that for the relief of *Fallot's tetralogy*, are dealt with on pp. 304-5.

*Banti's syndrome*, or splenic anæmia, is now thought to be always due to portal obstruction, due to intrahepatic or extrahepatic causes, such as thrombosis of the splenic vein and a variety of other conditions. Whipple (1945) has anastomosed the portal and systemic circulations in 10 cases without an operative death, with remarkable improvement in six.

Other feats of vascular surgery include successful operation for *coarctation of the aorta*, *double aortic arch* (which may cause severe cyanosis, dyspnœa and dysphagia by obstructing the trachea and œsophagus), and *anomalies of the right subclavian artery*.

### CHEST SURGERY

The surgical treatment of *bronchiectasis* is now on a sound footing. Kay (1947) reports an operative mortality of 0.4 per cent. in 220 lobectomies. Although it is undoubtedly true that a number of cases improve and even become symptom free under conservative treatment, the outlook for the majority of medically treated cases is one of prolonged disability with

considerable shortening of life. For properly selected cases surgery appears to offer the best chances of cure.

Several cases of *congenital œsophageal atresia* have now been operated on successfully (Franklin, 1947). If these cases are to have any chance of survival, it is essential that they should be diagnosed early and sent promptly to a competent chest surgeon.

### GASTRO-INTESTINAL SURGERY

*Congenital pyloric stenosis* is now treated in this country mainly by surgery. Ladd (1946) reports a mortality of 0.9 per cent. in 557 cases, with no death in the last 225. Levi (1941) reported a series of 105 breast-fed cases in this country without a death. The operative mortality is so low, and the post-operative recovery under good pædiatric care so rapid, that few prefer medical treatment with eumydrine, with its prolonged course, the consequent anxiety for the parents, and the constant danger of infection in the form of gastro-enteritis.

In cases of *imperforate anus* a technique has been evolved for demonstration of the extent of the defect without the use of barium. An X-ray photograph is taken with the child inverted, or on its side with the knees flexed against the abdomen. Gas rises to the most distal segment of the colon, and when a finger is placed on the perineum the distance separating the two segments can be seen. Rhodes (1946) emphasizes that surgical relief is never an emergency measure. He does not have his patients X-rayed before twenty-four to forty-eight hours have elapsed, and will not operate until convinced that the bowel will not descend farther—which may take up to four or five days, by which time almost all cases can be operated on through the perineum. It is often found that there is only a thin membrane between the two segments of bowel.

### References

- Alexander, H. (1946): *J. Amer. med. Ass.*, **132**, 434.  
 Enders, J. F., et al. (1946): *J. exp. Med.*, **84**, 407.  
 Franklin, R. A. (1947): *Lancet*, **ii**, 243.  
 Gesell, A. (1945): "How a Baby Grows," New York and London.  
 —, and Amatruda, C. S. (1941): "Developmental Diagnosis," New York and London.  
 —, —, et al. (1940): "The First Five Years of Life," New York and London.  
 Hughes, Enid L. (1942): *Brit. med. J.*, **ii**, 69.  
 Kay, E. B., et al. (1947): *Ann. int. Med.*, **26**, 1.  
 Ladd, W. E. (1946): *J. Amer. med. Ass.*, **131**, 647.  
 Lehr, D., et al. (1946): *J. Pediat.*, **29**, 275.  
 Lennox, W. G. (1947): *J. Amer. med. Ass.*, **134**, 138.  
 Levi, D. (1941): *Brit. med. J.*, **i**, 963.  
 Nixon, N., and Lewis, D. B. (1946): *J. Urol.*, **56**, 554.  
 Platou, R. V. (1947): *J. Amer. med. Ass.*, **133**, 10.  
 Rhodes, R. J. (1946): *Ann. Surg.*, **123**, 877.  
 Taran, L. (1947): *Amer. J. Med.*, **2**, 285.  
 Waller, H. (1947): *Mthly. Bull. Min. Hlth.*, **6**, 73.  
 — (1946): *Arch. Dis. Child.*, **21**, 1.  
 Whipple, A. O. (1945): *Ann. Surg.*, **122**, 449.

# ADVANCES IN THE TREATMENT OF TROPICAL DISEASES

By N. HAMILTON FAIRLEY, C.B.E., M.D., D.Sc., F.R.C.P., F.R.S.  
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Senior Physician, Hospital for Tropical Diseases, London.*

DURING the second world war tropical disease in the Pacific and South-East Asia proved as serious a menace to Allied troops as did the Japanese. Early in 1941 the loss of Java had deprived the Allies of over 90 per cent. of their quinine supplies. In 1942-43 the casualties from malaria, dysentery, mite-typhus and dengue in the Pacific were five to thirty times as great as battle casualties. The gravity of the problem naturally elicited an unprecedented effort on the part of the various Medical Services and Research bodies in the United Kingdom, U.S.A., and Australia, to develop means of controlling and curing these diseases. For this reason most of the more important contributions of the past few years in tropical diseases have originated as part of the war effort; many of them are only now being published for the first time.

## MALARIA

Wiselogle (1946) reports in his "Survey of Anti-Malaria Drugs, 1941-45", that over 12,000 new compounds were investigated for suppressive activity in bird malaria under the direction of the National Research Council in the U.S.A. Sixty-five of the most promising of these compounds were then tested for suppressive action in human malaria infection and 20 of these used for further testing for prophylactic and curative action in vivax malaria. The two antimalaria drugs of outstanding importance which have emerged from this work have been the 4-amino-quinoline compound known as aralen or chloroquine (SN.7618; resochin) and the 8-amino-quinoline compound, pentoquine (SN.13276). Similarly in this country many new compounds were tested under the direction of the Medical Research Council; the outstanding discovery was that of paludrine (M.4888).

*Chemotherapeutic control.*—In Australia a special Medical Research Unit was established at Cairns to study the suppressive and causal prophylactic action of antimalaria drugs in experimentally infected volunteers. During these researches some 850 healthy volunteers were heavily infected with sporozoite-induced malaria, using New Guinea strains of *P. falciparum* and *P. vivax*. The drugs studied included quinine, certain sulphonamides of the sulphadiazine series, mepacrine (atebrin), pamaquine (plasmoquine), the 4-amino-quinolines—sontochin (SN.6911) and chloroquine or aralen (SN.7618) sent for testing by the National Research Council, U.S.A.—and the biguanides—paludrine (M.4888) and M.4430, sent by the Medical Research Council, U.K.

At Cairns, Fairley and his colleagues (1945) found that quinine, even in a dosage of 10 grains (0.65 gm.) daily, was ineffective in suppressing falciparum malaria and often failed also with heavy vivax infections. On the other hand, mepacrine, in dosage of 0.1 gm. daily, completely suppressed vivax and falciparum malaria during the period of drug administration, and produced radical cure of falciparum malaria provided the daily dose was continued for three weeks after the last exposure to infection. Granted strict atebrin discipline, these results implied that (1) troops could fight in hyperendemic malaria areas with insignificant malaria casualties, (2) there would be practically no malaria mortality, and (3) blackwater fever would disappear. Subsequent field results in the Pacific and South-East Asia largely confirmed the validity of these experimental findings.

A special feature of the investigation was the routine use of subinoculation, non-immune volunteers receiving 200 c.cm. of blood by direct transfusion to determine the presence or absence of submicroscopic infection in the donors who were exposed to infective bites when taking daily doses of the drug under test. This technique enabled antimalaria drugs to be classified into two groups:—

(1) Schizonticidal suppressants, such as mepacrine and aralen, which exerted suppressive and possibly curative effects by destroying the asexual parasites after they had appeared in the blood.

(2) Complete or partial causal prophylactics, such as pamaquine and paludrine, which acted on the pre-erythrocytic stages of the parasites, either destroying them completely (*P. falciparum*) or inhibiting their multiplication, thus delaying the appearance of asexual erythrocytic parasites in the circulating blood (*P. vivax*). It was also found in untreated control volunteers that normally asexual parasites first appear in the blood on the seventh day following *P. falciparum* infection and on the ninth day following *P. vivax* infection.

Although atebrin proved a very effective drug in the chemotherapeutic control of malaria in jungle warfare, it possessed certain disadvantages, since daily administration was necessary, it caused yellow discoloration of the skin, and occasionally produced toxic symptoms of which skin eruptions of lichen planus type were the most formidable; rarely there was an associated aplastic anæmia or agranulocytosis. For these reasons paludrine or aralen are likely to replace mepacrine for suppressive purposes in the future.

#### NEW ANTIMALARIA DRUGS

(1) *Aralen or chloroquine*.—This drug is one of the 4-amino-quinolines which, under the name of resochin (SN.7618), was patented by the Germans in 1939. Little was known of its pharmacological or antimalarial properties until it was extensively studied in the U.S.A. during the war. The Board for Co-ordination of Medical Studies (1946) and Wiselogle (1946) have reported on its activity as an antimalarial agent. Aralen has a similar though more

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of administering paludrine for suppressive purposes is probably 100 mgm. twice weekly at three- to four-day intervals; if it is being given once weekly the adult dose should be 0.3 gm.

### BACILLARY DYSENTERY

One of the most important therapeutic advances has been the discovery that certain of the sulphonamides control and cure bacillary dysentery. Marshall and his associates (1941) first described the chemical constitution and pharmacological properties of sulphaguanidine and as a result of extensive experiments suggested its use in bowel infections. Fairley and Boyd (1943) investigated its therapeutic value in bacillary dysentery in troops in the Middle East. These observers had previously been using a highly concentrated Shiga antidysenteric serum with unsatisfactory results, and in vivid contrast to this were able to show that sulphaguanidine was a specific cure for Shiga dysentery.

Owing to the necessity for identifying the organism before beginning treatment in their first series of cases, most of the patients did not receive sulphaguanidine until the third or fourth day of the disease. Later it was found that its immediate administration in full dosage at the onset of symptoms in the forward areas resulted in rapid control of the diarrhoea and radical cure; by preventing multiplication of dysentery bacilli the disease was aborted before the colonic mucosa was seriously damaged, and convalescence was correspondingly shortened. The case mortality in the last 10,000 cases of diarrhoea and bacillary dysentery receiving sulphaguanidine in New Guinea was 0.05 per cent. Hill (1946) reported similar successful use of sulphaguanidine on a large scale in Burma.

Successful results have been reported in the treatment of dysentery by sulphasuxidine, which is regarded by some observers as superior to sulphaguanidine in eliminating *B. dysenteriae* in carriers, especially in Sonne infections. Sulphadiazine was also successfully used on a large scale in the U.S.A. forces for the treatment of bacillary dysentery. With sulphadiazine or sulphathiazole there is always the danger of renal complications—anuria and hæmaturia—especially in dehydrated patients; from this viewpoint sulphamezathine would appear to be preferable.

### AMÆBIASIS AND AMÆBIC DYSENTERY

In the South East Asia Command the problem of diarrhoea and dysentery was second only to malaria. Hargreaves (1945) pointed out that owing to malnutrition and lack of drugs following the fall of Burma, chronic dysentery became rife. Marriott (1945) estimated that *E. histolytica* was responsible for 20 per cent. of the diarrhoea and dysentery in South East Asia Command. The return of infected troops from abroad focused attention on the disease and some of its rarer complications, such as amœboma.

*Amœboma*.—An amœboma is an amœbic granuloma involving the cæcum, colon or rectum; it often produces a palpable tumour and may show radiologically a constrictive filling defect in the bowel. Frequently it is erroneously



powerful schizonticidal action than mepacrine but does not discolour the skin. It suppresses vivax malaria, is extremely effective in terminating overt attacks, but does not prevent relapses. It suppresses and radically cures falciparum malaria. For suppressive purposes the adult dose is 0.3 gm. once a week. For treatment of overt attacks the initial dose is 0.6 gm., followed after 6 to 8 hours by 0.3 gm.; the daily dose recommended for the next two days is 0.3 gm. This regimen is stated to produce radical cure in falciparum malaria and to terminate overt vivax attacks. Toxic symptoms include gastro-intestinal disturbances, headache, visual disturbances and pruritus.

(2) *Pentoquine*.—Wiselogle (1946) and Loeb (1946) have recently reported on pentoquine (SN.13276), which is an 8-amino-quinoline with a therapeutic action similar to plasmoquine. When given in a dosage of 60 mgm. daily in combination with quinine, 30 grains (2 gm.) daily, for fourteen days, it is stated to produce radical cure in vivax malaria. Toxic effects are unfortunately similar to those of plasmoquine and include gastro-intestinal symptoms and methæmoglobineythæmia, which are common, and hæmolytic anæmia, hæmoglobinuria, or agranulocytosis, which are rare. Quinine-pentoquine treatment should be undertaken only when the patient is at bed rest under strict medical supervision. The results are comparable with those obtained by quinine-plasmoquine treatment, originally discovered by Sinton in 1930 and re-introduced during the recent war.

(3) *Paludrine*.—The brilliant researches of Curd, Davey and Rose (1945) culminated in the synthesis of the biguanides M.4330 and M.4888 (paludrine) and the discovery of their causal prophylactic and therapeutic action in bird malaria.

In the treatment of overt falciparum malaria Maegraith and his colleagues (1945) found that paludrine in a dosage of 50 to 600 mgm.; twice daily for fourteen days, would control the clinical attack; it was not possible to determine the radical cure rate in this series. Later, Fairley and his colleagues (1946) reported radical cure in 106 out of 107 cases of falciparum malaria (New Guinea strains) receiving 0.3 gm. of paludrine daily for ten days. Similar results were obtained in the clinical cure of vivax malaria, but after a variable interval many cases relapsed. A single dose of 100 to 300 mgm. of paludrine has proved successful in controlling the clinical attack of falciparum or vivax malaria, and in future 0.3 gm. may become the standard treatment for village malaria when clinical but not radical cure is desirable.

Paludrine is superior to all known antimalaria drugs as in non-toxic dosage it acts as a causal prophylactic. Fairley and his colleagues (1946) report a specific lethal action on the pre-erythrocytic forms of *P. falciparum*, which are highly susceptible; thus a single dose of 50 to 100 mgm., given from 39 to 131 hours after exposure to infective bites, afforded complete protection. In vivax malaria, paludrine is an effective suppressant and while the drug is being administered erythrocytic parasites do not appear in the blood; after cessation of the drug, however, relapses occur. The best method

attributed to the preponderant loss of sodium over chloride in the stools. Serum potassium was not increased and there was no evidence of adrenal insufficiency. Increasing the salt intake to 15 gm. daily corrected the dehydration in a few days.

*Treatment: Folic acid.*—Lopez, Spies and their colleagues (1946) report that thiamine, nicotinic acid and riboflavine lack therapeutic value in initiating regeneration of the blood in persons with megalocytic anæmia, but that after synthetic folic acid therapy there is prompt reticulocytosis and blood regeneration and a tendency for the alimentary tract to return to normal function. The dosage in their series varied. At first 100 mgm. twice daily was given; later 5 to 10 mgm. daily was found to be just as effective as the larger dosage. The duration of treatment varied from 22 to 152 days.

Somewhat variable results are now being reported in regard to the efficacy of folic acid, both as regards blood regeneration and the control of steatorrhœa and other alimentary symptoms. Some patients respond well; in others results are disappointing. It is now known that although folic acid generally elicits a satisfactory hæmatological response in pernicious anæmia it entirely fails to protect against the development of subacute combined degeneration of the cord. In the past, consistently good results have been obtained in patients with classical tropical sprue by graded high-protein diets and the administration of crude liver extracts (dosage =  $1\frac{1}{2}$  lb. whole liver daily) by the mouth, or parenteral injections of crude liver extracts of campolon type, in a dosage of 6 c.cm. daily. It remains to be determined whether similar consistently good results can be obtained when folic acid is combined with a strict high-protein diet regimen. (For further details of folic acid therapy in blood diseases see p. 311.)

#### SCRUB TYPHUS (Tsutsugamushi Disease)

In Burma and the Pacific, scrub typhus, which is caused by *Rickettsia orientalis* and transmitted to man by the bite of a larval mite, had an over-all mortality approximating to 8-10 per cent. Considerable variation in the mortality rate was found in different areas, the range varying from 0.0-30.0 per cent. This naturally increased the difficulties of assessing the value of new modes of therapy. The sulphonamides and many drugs were investigated without success.

Tierney (1946) treated a control series of scrub typhus cases with large doses of para-aminobenzoic acid, given orally in an initial dose of 6 to 8 gm., followed by 3 gm. ever two hours. This dosage regimen gave a blood concentration of 30 to 60 mgm. per 100 c.cm. Treatment was continued until the temperature had remained normal for one week. Since the sulphonamides are antagonistic to para-aminobenzoic acid, secondary bacterial infections were treated with penicillin. In the treated series of 18 cases there were no deaths, complications were fewer, and the course was generally

diagnosed as carcinoma, and if operated on without anti-amœbic treatment may end fatally. These different aspects of amœboma have been reported during the past year by Lindskog and Walters (1946). Howe (1946) encountered 6 cases of amœboma, 5 of which had responded to medical treatment. Occasionally amœbiasis of the skin and subcutaneous tissue may develop after colostomy.

Smyth (1946) records such a case admitted to hospital diagnosed as rectal carcinoma. There was no history of dysentery and no amœbæ were found in the stools, but the patient had served abroad. A lump appeared in the left lower quadrant of the abdomen, associated with diarrhœa and hæmorrhoids. A left colostomy was performed. Subsequently a large infected area appeared around the bowel and spread widely, involving the abdominal wall. *E. histolytica* was found and the condition cleared up completely after emetine and diodoquin treatment.

Howells (1946) records two cases of rectal amœboma which were regarded as malignant and which subsequently responded well to emetine. In one instance a wart-like mass extended for about an inch around the anal margin; in the other there was a hard grey mass of tissue with an ulcer crater which exuded dark thin pus containing *E. histolytica*.

*Treatment.*—Hargreaves (1946) reviewed the treatment of amœbic dysentery. He pointed out that emetine is the best amœbicidal drug and that whereas emetine injections are specific for amœbic hepatitis and liver abscess, emetine-bismuth-iodide is much superior for amœbic bowel infections. The chances of cure are increased if a daily retention enema of one of the iodine-oxyquinoline compounds, such as chiniofon, are combined with E.B.I. The importance of secondary bacterial infection is stressed in severe refractory cases, and the use of penicillin is advocated as a life-saving procedure in such patients. Sulphaguanidine or sulphasuxidine are also advised for the same reason. The author rightly maintains that every case of amœbic dysentery should be treated as a separate clinical problem, and emphasizes that sigmoidoscopy and radiography may afford valuable information regarding treatment.

#### TROPICAL SPRUE

Keele (1946) reports that of 8,846 medical cases evacuated from India during 1943-45, some 1,073 suffered from sprue. The clinical picture in the majority of instances was not that of classical sprue, and only 26 per cent. showed megalocytic anæmia. Two groups were recognized: those seen at onset presenting anorexia, diarrhœa, vomiting and weakness; those seen later presenting meteorism, glossitis, cheilosis and scaling of the skin. Malaria was a common complication.

Whatever the ultimate cause of sprue may be, defective intestinal absorption of essential food elements—especially fat, glucose, calcium and certain vitamins—constitutes the essential basis of the syndrome. Cayer and his colleagues (1945) recently reported low levels for thiamine, riboflavine and vitamin C in sprue cases. Black (1946) also finds clinical and biochemical evidence of salt deficiency modified to some degree by acidosis; this is

observed during proctoscopy will contain ova, even when they are repeatedly absent from the stools.

Williams (1947) records the results of an extensive serological survey by the complement fixation reaction in 560 members of the R.A.A.F. exposed to infection with *S. japonicum* at Leyte.

The antigen used was an 18-year-old alcoholic extract of livers of Planorbis snails infected with *S. spindale*. The serological reaction proved of outstanding value in diagnosis and was less tedious and a somewhat more sensitive diagnostic laboratory test than repeated faecal examinations for ova. The conclusion reached is that no investigation of this kind can be complete unless the complement fixation reaction on sera as well as stool examinations are carried out. The presence of persisting positive reactions in the absence of demonstrable ova is explicable on the basis of (a) unisexual infection at the time of exposure, (b) the exclusive or predominant survival of male worms following treatment, and (c) the mildness of the original infection, there being so few worms that ova are not present in sufficient numbers in the excreta to be demonstrable.

*Treatment.*—Bang and Hairston (1946) investigated the action of antimony compounds on the worms of *S. japonicum* in experimentally infected guinea-pigs. They confirmed and extended the observations of previous workers that tartar emetic and other antimonials affected the egg-laying capacity of the female worm.

Fouadin was most extensively used as it was more easily administered, but tartar emetic and anthiomaline were also found to be effective. These drugs first produced degeneration of the yolk gland in the female worm, then loss of hæmatin, then degeneration of the ovary and, finally, shrinkage of the whole worm. If treatment was continued beyond the standard four-week period to six weeks, a greater percentage of worms was killed. Antimony apparently had no direct effect on ova. A few days after treatment starts there is a shift of worms from the mesenteric veins to the portal venules. Relapses following discontinuance of treatment were due to a gradual recovery of the female worms to lay eggs and also to return to their former location in the branches of the portal veins.

Mason, Daniels, Paddock and Gordon (1946) studied 481 cases of *S. japonicum* infestation acquired at Leyte. On the basis of a comparable series, treatment with tartar emetic was found to be much more effective than that with fouadin. The apparent cure rate judged by negative stools was 81 per cent. for the series treated with tartar emetic and 18 per cent. for the series receiving fouadin. Patients treated with tartar emetic received 24 grains (1.5 gm.) in twenty-nine days, whilst those treated with fouadin received 65 c.cm. of a 6.3 per cent. solution in twenty-five days. Significant toxic reactions with tartar emetic were rare.

*Intensive treatment with tartar emetic.*—In Southern Rhodesia, Alves and Blair (1946) have introduced a method for intensive mass treatment of infections by *S. mansoni* and *S. hæmatobium* with sodium-antimonyl-tartrate by a multiple syringe method. The standard dosage was 12 mgm. per kgm. body weight, given as six injections in two days. In a series of 100 cases it was never found necessary to discontinue treatment because of severe toxic reactions of the drug. Immediate therapeutic results in patients with intestinal or vesical schistosomiasis appeared promising.

mild, whereas in the control series of 16 cases there were 3 deaths, 7 ran a severe course, and convalescence was much more prolonged.

Similarly in the treatment of murine typhus, Smith (1946) reports encouraging results in 46 patients who received an average dosage of 95 gm. of para-aminobenzoic acid. The temperature on an average returned to normal on the twelfth day of the disease in the treated series and on the sixteenth day in the control series.

### BILHARZIA DISEASE (SCHISTOSOMIASIS)

At Leyte in the Philippines, several hundred cases of Asiatic schistosomiasis (*S. japonicum*) occurred in American troops and Australian airmen.

*Clinical features.*—Faust, Wright, McMullen and Hunter (1946) studied the clinical aspects. Cases fell into one of four groups in the acute stage, which lasted for three to four months.

(1) The fulminating type due to hyperinfection which killed from toxæmia before ova were found.

(2) The acute type with sudden onset four to five weeks after exposure. Clinical features included prolonged fever, urticaria or angioneurotic-like œdema, toxic pains simulating dengue, gastro-intestinal and dysenteric features, enlarged tender liver suggesting hepatitis, and a dry unproductive cough suggestive of upper respiratory infection. Important points in diagnosis were the high eosinophilia, soreness and stiffness of the neck (nuchal rigidity) and yellowish nodules (bilharzia pseudo-tubercles) 1-3 mm. in diameter in the mucosa of the rectum and sigmoid colon demonstrable during sigmoidoscopy. Within 81 days of infection, ova of *S. japonicum* were demonstrated in the feces in only 61 per cent. of these patients.

(3) The type with insidious onset, symptoms not appearing for two to five months after exposure.

(4) The symptomless type in which ova were found during routine stool examinations.

Complications included involvement of the lungs, brain and skin.

Carrol (1946) reports five cases of central nervous system involvement in soldiers contracting schistosomiasis in Leyte in 1944.

The blood showed moderate eosinophilia and ova were present in the stools. In four cases the onset of neurological symptoms was in the acute stage of the disease and consisted of drowsiness followed by coma. There was weakness, spasticity and exaggerated deep reflexes due to pyramidal tract involvement. Clinical improvement followed treatment. In the fifth case neurological complications developed four months after the acute stage had subsided, at a time when the eosinophil count was normal. Jacksonian epilepsy and hemiplegia developed. Therapy failed to improve the conditions.

*Diagnosis.*—In intestinal schistosomiasis it is becoming increasingly recognized that repeated examination of the stools may be necessary to demonstrate ova. Faust and Ingalls (1946) advocate the technique of sedimentation of the stools with 25 times their volume of 0.5 per cent. glycerin in water for routine use, in addition to the direct microscopic examination of faecal mucus for ova. Even so, the microscopic examination of the stools may be negative, especially in the acute phase of the disease. Faust (1946) points out that in such cases scrapings of the small yellow nodules in the mucosa

## References

- Alves, W., and Blair, D. M. (1946): *Lancet*, i, 9.
- Bang, F. B., and Hairston, N. S. (1946): *Amer. J. Hyg.*, 44, 313.
- Behm, A. W., and Hayman, J. M. (1946): *Amer. J. med. Sci.*, 211, 385.
- Black, D. A. K. (1946): *Lancet*, ii, 671.
- Carroll, D. G. (1946): *Bull. Johns Hopk. Hosp.*, 78, 219.
- Cayer, D., Ruffin, J. M., and Perlzweig, W. A. (1945): *Amer. J. med. Sci.*, 210, 200.
- Coggeshall, L. T. (1946): *Mil. Surg.*, 98, 89.
- (1946): *J. Amer. med. Ass.*, 131, 8.
- Culbertson, J. T. (1947): *Roy. Soc. trop. Med. Hyg.* (in the press).
- , Rose, H. M., et al. (1946): *Puerto Rico J. pub. Hlth., trop. Med.*, 22, 139.
- Curd, F. H. S., Davey, D. G., and Rose, F. L. (1945): *Ann. trop. Med. Parasitol.*, 39, 208.
- Fairley, N. H. (1945): *Trans. roy. Soc. trop. Med. Hyg.*, 38, 311.
- , and Boyd, J. S. K. (1943): *Ibid.*, 36, 254.
- , et al. (1946): *Ibid.*, 40, 105.
- Faust, E. C. (1946): *Amer. J. trop. Med.*, 26, 113.
- , and Ingalls, J. W. (1946): *Ibid.*, 26, 559.
- , Wright, W. H., McMullen, D. B., and Hunter, G. W. (1946): *Ibid.*, 26, 87.
- Hargreaves, W. H. (1945): *Trans. roy. Soc. trop. Med. Hyg.*, 39, 470.
- (1945): *Lancet*, ii, 68.
- (1946): *Quart. J. Med.*, 15, 1; *The Practitioner*, 157, 93.
- Have, P. (1946): *Lancet*, ii, 508.
- Hill, I. G. W. (1946): *Trans. roy. Soc. trop. Med. Hyg.*, 39, 470.
- Howells, Gwyn (1946): *Brit. med. J.*, i, 161.
- Keele, K. D. (1946): *Ibid.*, ii, 111.
- Lindskog, G. W., and Walters, W. (1946): *J. Amer. med. Ass.*, 131, 92.
- Loeb, R. F. (1946): *Ibid.*, 132, 321.
- Lopez, G. G., Spies, J. P., Menendez, A. J., and Toca, L. R. (1946): *Ibid.* 132, 906.
- Macgrath, B. G., et al. (1945): *Ann. trop. Med. Parasitol.*, 39, 232.
- Marriott, H. L. (1945): *Lancet*, i, 679.
- Marshall, E. K., Bratton, E. C., Edwards, L. B., and Walker, E. (1941): *Bull. Johns. Hopk. Hosp.*, 68, 94.
- Mason, P. K., Daniels, W. B., Paddock, F. K., and Gordon, H. H. (1946): *New Engl. J. Med.*, 235, 179.
- Report of the Board for Co-ordination of Medical Studies (1946): *J. Amer. med. Ass.*, 130, 1069.
- Sinton, J. A., Smith, S., and Pottinger, D. (1930): *Ind. J. med. Res.*, 17, 793.
- Smith, P. K. (1946): *J. Amer. med. Ass.*, 131, 1114.
- Smyth, M. J. (1946): *Lancet*, ii, 376.
- Tierney, N. A. (1946): *J. Amer. med. Ass.*, 130, 14.
- Welch, A., Peters, L., Bueding, E., Valk, A., and Higashi, A. (1947): *Science*, 105, 486.
- Williams, F. E. (1947): *Trans. roy. Soc. trop. Med. Hyg.*, 40, 421.
- Wiselogle, F. Y. (1946): "A Survey of Anti-Malaria Drugs, 1941-45" *Ann. Arbor*, Vol. I, pp. 214, 388, 441.

## FILARIASIS

The infection with *Wuchereria bancrofti* of over 10,000 American troops stationed in the Pacific Islands directed the attention of the U.S. Army Medical Corps to this problem during the war.

**Diagnosis.**—In the early stages, diagnosis proved difficult owing to the absence of demonstrable microfilariae in the blood. Behm and Hayman (1946) found examination of the blood for microfilariae and eosinophilia of little diagnostic value. Attacks of lymphangitis—especially of retrograde type—and lymphadenitis constituted the most reliable evidence of infection in the absence of demonstrable filaria worms in biopsy material.

**Medical care.**—Coggeshall (1946) describes the medical care of 2,295 cases of filariasis. Specific treatment was not given since the disease was regarded as being self-limited, provided recently infected individuals had been removed from endemic areas. The big problem with these men was a psychiatric one originating from fear of impotence, sterility and deformities, such as elephantiasis of the limbs and scrotum so commonly seen in natives. Reassurance and a maximum of outdoor exercise enabled 2,124 out of 2,295 men to be returned to full duty within four months.

**Specific treatment.**—In filaria infection of the cotton rat, *Litomosoides carinii*, Culbertson and Rose (1946) found that although certain antimony compounds killed the adult worms, microfilariae continued to circulate in the blood for months before finally disappearing. This suggested that in human filariasis the blood should be examined for microfilariae for long periods after treatment. Culbertson (1947) recently summarized the results of neostibosan therapy in the very large dosage of 12 to 15 gm. in fourteen days.

The blood of the control untreated series contained microfilariae after twenty-six months' observation. In 25 out of 35 treated patients, the microfilariae gradually decreased in numbers until after from three to thirteen months the blood was entirely cleared of microfilariae. Severe toxic features were absent from patients receiving this treatment in Puerto Rico, but in Mexico 5 out of 20 patients developed nephritis, one patient dying from this cause.

Although Culbertson's results show that filariasis may be cured by neostibosan, such intensive treatment cannot at present be advocated for routine treatment in man.

Welch and his colleagues (1947) report that all cyanines, and many other styryl dyes, have antifilarial activity. The most potent was No. 863, or 1'-ethyl-3:6-dimethyl-2-phenyl-4-pyrimidino-2'-cyanine chloride. Cures in infected cotton rats were produced when 1.0 mgm./kgm. was given intravenously, three to six times. Many months of observation showed that parent worms were killed. Twenty-seven human patients were apparently freed from parent worms by treatment with this drug in Puerto Rico and suffered no severe toxic reactions.

is altogether suppressed while the drug is being taken; in others the eruption continues, although to a lesser extent, and even so, irritation is markedly diminished or altogether abolished.

Similar results are often obtained in acute drug eruptions and in acute dermatitis venenata or contact eczema. In other cases of eczema, particularly those of obscure or constitutional origin, and in disseminated neurodermatitis my own results have been unconvincing. Baer and Sulzberger (1946), however, obtained relief of itching with *pyribenzamine* in a considerable variety of itching dermatoses. Similarly, Brack (1946) was able to report relief of irritation in neurodermatitis, prurigo, lichen planus, and even scabies; the objective appearances of the eruptions remained unchanged.

*Dosage and toxicity.*—In clinical use benadryl is given to adults by the mouth in capsules of 50 mgm., this dose being repeated two, three or four times daily. Considerably larger doses have been given with safety, and Hunter (1947) gave totals of 0.3 to 1 gm. of anthisan daily, in divided doses. These drugs have no appreciable cumulative action, so that maximum therapeutic effect is obtained in a few hours or, at the most, a couple of days. Their effect passes off rapidly, and when they are withdrawn relapse usually occurs within twelve hours to four days.

Of side-effects, drowsiness is the most frequent, but soon passes off when the drug is withdrawn; if troublesome, it may be corrected with small doses of amphetamine, given concurrently. Other less common toxic effects include dizziness, dryness of the mouth, headache and nausea; less often, a fall in blood pressure, diarrhoea and collapse have been recorded (Hunter, 1947). The latter manifestations appear only with larger doses and quickly subside when the drug is stopped. Even after several months of continuous administration of the normal doses serious toxicity has not been observed, and damage to organs does not appear to occur.

The effect of these drugs on irritation of such varied etiology, together with their cerebral depressant action, suggests that they may relieve itching by action on the central nervous system. If this is so, their discovery may be of the greatest importance. Up to the present no drug has been known which specifically influences irritation in the way that morphine, for example, relieves pain, although Ferreira-Marques (1947) has reported success with nicotinamide (see p. 282).

Severe itching is a serious and distressing symptom; if the general antipruritic action of these drugs can be further developed, an important contribution to dermatological therapy will have been made.

#### PENICILLIN

With the extended use of penicillin in the treatment of skin diseases some of the early optimism has been discarded, and indications and methods are becoming more soberly based. Penicillin may be applied to the skin in



# ADVANCES IN DERMATOLOGY

By F. RAY BETTLEY, M.D., M.R.C.P.

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WE are still in the immediate post-war period; still making up for the restricted communications and for the shortages which to some extent hampered work during the war years; still exploring and trying to develop the discoveries of those years which the circumstances of that time caused to be shelved or kept secret. Among those of the former category the anti-histamine substances seem at the moment to hold great promise.

## ANTI-HISTAMINE DRUGS

It is generally recognized that the local and general phenomena following injury may to a large extent be accounted for by the release of histamine or histamine-like substances in the tissues. The resemblance of the wheal which follows trauma or the injection of histamine into the skin to the lesions of urticaria suggests that in the latter condition, too, the release of histamine-like substances plays a large part. This has raised the question how far other allergic and anaphylactic reactions involve the production of these substances—a question that has not as yet been fully answered.

Recent work has been directed to the investigation of substances which have the effect of neutralizing the action of histamine in the animal body. These substances, first synthesized in 1932, have been extensively investigated in France since 1937, and the fruits of this research are now of considerable potential value. Among the drugs produced, benadryl has so far been most easily available in this country, whilst others, such as anthisan, appear to promise even greater effectiveness in the future.

*Experimental work.*—In experimental animals it has been found that the preliminary administration of these drugs will afford complete protection against very many times the lethal dose of histamine. Nilzen (1947), working with antergan in human subjects, found urticarial reactions to histamine and other substances markedly diminished when the anti-histamine drug was injected at the same time. On the other hand, Nexmand and Sylvest (1947) found that preliminary ingestion of antergan did not alter the objective appearance and size of the urticarial reaction, but diminished the itching to which it gave rise.

*Clinical results.*—The experimental findings are in accord with the results of clinical trials in urticaria, in which relief of itching is sometimes obtained without any apparent change in the extent of the eruption. My own impressions with *benadryl* have been that with this drug good results are often obtained in urticaria and papular urticaria. In some cases the eruption

improvement, but internal administration has likewise seldom proved of much value.

*Fungus infections.*—When ringworm is complicated by superadded pyococcal infection, penicillin, either locally or by injection, may be valuable at the beginning of treatment. Once sepsis is eradicated the older accepted treatments with fungicides should be substituted.

#### VITAMINS

Until recently, vitamin therapy was thought to be indicated only in deficiency states, to ensure an intake adequate to the needs of the normal individual. Certain of the vitamins, however, appear to have therapeutic activity outside the sphere of avitaminosis.

*Calciferol.*—The calciferol treatment of *lupus vulgaris*, instituted in England by Dowling and Prosser Thomas (1946) and independently in France by Charpy (1946), is being investigated on a large scale in many countries. Some workers have obtained indifferent results, but the majority report striking improvement in a high proportion of cases and complete clinical cure in a substantial number.

In England, treatment is usually given in the form of ostelin tablets each of 50,000 international units, two or three tablets daily by the mouth. Treatment by injection does not seem to produce better results. After a temporary exacerbation of the eruption lasting for a few weeks clinical improvement sets in and is often continued for many weeks, even up to apparent cure. Calciferol treatment is not, it must be understood, a substitute for other general treatment. Rest, a full diet, and good general hygienic conditions still play a part of the greatest importance in the treatment of lupus, as in other tuberculous conditions. Nor does it entirely replace local treatment. In the past much harm has been done with over-energetic local treatments resulting in scarring far worse than that of the untreated lupus; but most authorities are agreed that in certain cases scraping, and Kromayer lamp therapy, decidedly enhance the value of calciferol treatment.

The administration of calciferol in the doses mentioned may be continued for periods of many months, and on the average five to six months of treatment are required to produce the maximum benefit. The mode of action of calciferol is not known; a similar benefit has been observed in cases of glandular, bone and joint tuberculosis, but foci of pulmonary disease seem at times to have been aggravated. For this reason the calciferol treatment of lupus is contraindicated when pulmonary disease is also present or, at the most, should only be undertaken with the greatest caution.

Toxic manifestations are common and may be serious. Anorexia, headache and mental depression are the earliest; thirst and polyuria are sometimes complained of. In more severe cases diarrhoea and vomiting, collapse, and eventually even coma, may occur.

solution, in sterile water or saline containing 400 to 500 Oxford units per c.cm., either in the form of dressings or as a spray. In ordinary practice, however, creams are easier to handle. Emulsified bases of the oil-in-water type are most satisfactory, but the tendency to deterioration and contamination on keeping must be borne in mind. Penicillin cream should be kept in a cool place, preferably in a refrigerator, and the amount required for each dressing removed from the jar with a sterile spoon or spatula. Collapsible metal tubes are preferable. Hypersensitivity and consequent eczematization are liable to arise, sometimes to penicillin itself, but often to some ingredient of the cream base, such as lanette wax. This constitutes a decided drawback to the use of creams compared with aqueous solutions.

The value of penicillin in certain dermatoses seems definitely established:—

*Impetigo contagiosa*.—In various forms of impetigo, penicillin cream has given good results. It is not necessarily more effective than older methods of treatment, but on the average produces cure in a shorter time. A small proportion of cases fail to respond, and if five days' treatment does not see the patient cured or very nearly so, penicillin should be abandoned in favour of the older routine methods.

*Eczema and seborrhœic dermatitis*.—In the absence of secondary infection penicillin can be expected to produce little improvement in these disorders. When secondary infection is present, however, penicillin often proves of inestimable value, and its effects may far surpass those of any other application. Hypersensitization is perhaps particularly likely to develop in cases of this kind, so that it is safer to avoid creams and to use only aqueous solutions. Once secondary infection has been brought under control penicillin is not likely to be of further help; it should not be continued beyond this point, but the treatment of the underlying condition should be resumed along the usual lines.

*Sycosis barbæ*.—Immediate good results are often obtained with the use of penicillin cream or spray. Hellier (1947), however, has drawn attention to the high proportion of relapses which occur after treatment is stopped, attributing these partly to the presence of infection in the antra or accessory nasal sinuses, and partly to the persistence of virulent organisms on the surface of the skin. Brian Russell (1946), with the latter consideration in mind, advises the continuance of treatment for at least two weeks after apparent cure, and is able to report 50 per cent. permanent cures after an average of six weeks' treatment. My own experience has not been so successful, but I have found that in a proportion of cases penicillin, though not necessarily producing permanent cure, at least keeps the disorder in check better than any other remedy.

*Focal sepsis*.—In dermatoses of which focal sepsis is believed or suspected to be the chief cause the use of penicillin has been disappointing. Application of the antibiotic to the skin lesions could hardly be expected to produce much

improvement, but internal administration has likewise seldom proved of much value.

*Fungus infections.*—When ringworm is complicated by superadded pyococcal infection, penicillin, either locally or by injection, may be valuable at the beginning of treatment. Once sepsis is eradicated the older accepted treatments with fungicides should be substituted.

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During the period of administration of calciferol, profound biochemical changes may take place in the blood and tissue fluids. The serum calcium is often raised to 12 to 15 mgm. per cent., but toxic symptoms do not appear to depend upon this. Macrae (1947) regards the erythrocyte sedimentation rate as a better indication and considers that calciferol should be stopped if this rises above 40 mm. in the first hour. At the annual meeting of the British Association of Dermatology (July, 1947) Wigley drew attention to a fall in serum phosphatase in these cases; Ingram and Anning, however, considered serum-diffusible calcium of more importance, and have found impaired renal function. Unfortunately the maximum therapeutic effect is obtained with doses bordering on toxicity so that good results can only be expected with patients under close supervision in conditions where frequent biochemical tests can be carried out. Ingram has raised the question of how far renal changes may be permanent.

To sum up, the calciferol treatment of lupus still bristles with problems. It has yet to be determined whether or not the apparent cures are permanent; how to recognize toxicity, and how to deal with it when it occurs; perhaps more important, to determine how calciferol acts, and what its ultimate harmful effects are likely to be. Already, however, it can be said that we have in our hands a remedy of undoubted value.

*Vitamin A.*—Massive dosage with this vitamin, up to 250,000 international units daily, has been tried in a number of dermatoses in which hyperkeratosis or dyskeratosis appears to be the predominant change. Improvement has sometimes been obtained even though deficiency of this vitamin cannot be proved. Among others, Leitner (1946) obtained considerable improvement in cases of pityriasis rubra pilaris and Darier's disease, and I have seen improvement in mild cases of congenital ichthyosis following doses of 50,000 i.u. daily for a few weeks.

Little is known about toxic effects, which do not appear to have been noticed even with prolonged high dosage.

*Vitamin B.*—Ferreira-Marques (1947) reported the treatment of various dermatoses with high doses of nicotinamide, up to about 1 gm. daily, by the mouth and by injection. He obtained relief of itching in almost all irritable conditions, irrespective of their nature. A series of cases of Bazin's disease was also treated, with very good results. Overdosage results in anorexia, vertigo, and lassitude; more severe symptoms are nausea, vomiting and diarrhoea. The action of this vitamin evidently merits further investigation.

#### THE TREATMENT OF PLANTAR WARTS

The treatment of these painful warts often presents a difficult problem. Radium and X-ray treatments do not by any means give uniform results and are not, in my view, the treatments of choice as a routine even when they are easily available. Removal with the sharp spoon gives good immediate

results with little disturbance of the patient. If, after this, the warts recur it is often only after a lapse of a few months during which complete cure appears to have been achieved. Such patients may have been discharged from observation and erroneously regarded as cured.

Sydney Thomson (1943) has made a valuable contribution to this subject which appears not to have received the wide attention it deserves.

By Thomson's method the affected part of the sole is immersed for ten minutes every night in 3 per cent. formalin contained in a saucer or similar shallow vessel. The liquid should be of such depth as to cover the affected area without coming over the skin on the sides and dorsum of the toes and feet. After a few days the wart gives the impression of becoming more superficial until ultimately it can easily be scraped away by the patient's finger, leaving normal skin beneath. The surrounding skin is often made rough and scaly by this treatment, but provided the solution comes in contact only with the sole no other complication need be feared. Treatment is complete in three or four weeks in the average case, but occasionally needs to be continued for as long as seven or eight weeks.

This formalin treatment has the merits of simplicity and ready availability and has, in my hands, proved as effective as other methods.

### References

- Baer, R. L., and Sulzberger, M. B. (1946): *J. Invest. Derm.*, 7, 147.  
Brack, W. (1946): *Schweiz. Med. Wschr.*, 76, 316.  
Charpy, J. (1946): *Praxis*, 28, 46.  
Dowling, G. B., and Prosser Thomas, E. W. (1946): *Brit. J. Derm.*, 58, 45.  
Ferreira-Marques, J. (1947): *Acta dermatovenereol., Stockh.*, 27, 173.  
Hellier, F. F. (1947): *Brit. J. Derm. Syph.* 59, 249.  
Hunter, R. B. (1947): *Lancet*, i, 672.  
Leitner, Z. A. (1946): *Brit. J. Derm.*, 58, 11.  
Macrae, D. E. (1947): (In the press).  
Nexmand, P.-H., and Sylvest, O. (1947): *Acta dermatovenereol., Stockh.*, 27, 231.  
Nilzen, A. (1947): *Ibid.*, 27, 228.  
Russell, B. F. (1946): (In the press).  
Thomson, S. M. (1943): *Brit. J. Derm.*, 55, 267.

# ADVANCES IN THE TREATMENT OF VENEREAL DISEASES

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It is no exaggeration to say that the treatment of both gonorrhœa and syphilis has been revolutionized by penicillin. This revolution took place at a time when the necessity for rapid cure with consequent saving of working hours was paramount, and the fact that so many of the patients on whom the new drug was tried were under military discipline enabled large-scale trials to be carried out rapidly and in a reliable manner, and facilitated a reasonable follow-up for the great majority.

## GONORRHŒA

*Penicillin* is now the "drug of choice" in the treatment of gonorrhœa and, provided it is used intelligently and only in cases of proved gonococcal infection, it will bring about a rapid and permanent cure in a very high proportion of cases. The best reported results have followed five three-hourly injections of 30,000 units, but some workers claim to have obtained equally good results with schemes more suitable for out-patient use, such as three four-hourly injections of 100,000 units, or one of 200,000 units followed by a second of 200,000 units six to eight hours later (Batchelor *et al.*, 1946).

When penicillin is suspended in an oil-wax medium, such as 4.8 per cent. beeswax in peanut oil, the rate of absorption from the site of injection is retarded, with a consequent prolongation of the penicillin blood level. Results comparable to those following multiple injections of watery solutions often follow a single intramuscular injection of a reliable oil-wax suspension containing 250,000 to 300,000 units. In my hands this method has given good results, but the cure rate has not approached the 96 per cent. originally obtained by Romansky and Rittman in 1944 with only 100,000 units. It must not be forgotten that when gonorrhœa is treated with penicillin, particularly when the total dosage exceeds 200,000 units, there is a danger of masking or modifying an incubating syphilitic infection. In order to make certain that this has not happened, the patient should be examined periodically for at least three months, and serum tests for syphilis made at three and six months after treatment.

There is a fairly general impression that larger doses are needed for women than for men. It is hard to understand why this should be so, as the blood supplies of both urethra and cervix are excellent and the gonococcus should be reached easily by the penicillin. Gonorrhœa in women, however,

is almost invariably a mixed infection and sometimes the secondary organisms are resistant to penicillin. Possibly because of this the clinical response to treatment is often not nearly so dramatic as it is in men, and consequently, although gonococci do not reappear in smears or cultures, a cervicitis needing local treatment may persist. Weak astringent vaginal douches of permanganate of potash, 1:10,000, assist drainage and stimulate the healing of inflamed mucous surfaces, but it must be remembered that an attack of gonorrhœa is not infrequently accompanied by a trichomonas infestation and this organism should always be sought for when vaginal discharge persists for more than a week after penicillin treatment.

*Complications* such as salpingitis, epididymitis and arthritis react capriciously to penicillin, probably according to whether the gonococcus or some secondary invader is the responsible organism. In nearly all these cases a much larger dosage and a more prolonged period of administration are usually necessary, and even then the response is rarely dramatic. An obvious and accessible collection of pus, such as a peri-urethral abscess in the male or a bartholinian one in the female, must always be evacuated, preferably by incision rather than by aspiration, before treatment is started.

Gonococcal vulvo-vaginitis in small girls frequently relapses after treatment with penicillin and great caution is necessary in pronouncing the cure of this distressing and very infective condition. The little patient should whenever possible be treated in hospital, where the strictest precautions against reinfection by contaminated garments, bedclothes and towels can be taken.

Under certain well-regulated conditions *oral penicillin* gives good results in gonorrhœa. Bushby and Harkness (1946) claim to have cured 60 out of 62 patients with six three-hourly doses of 40,000 units, a total of 240,000 units in fifteen hours. According to these workers regular administration is of the utmost importance; they emphasize also that the fluid intake must be restricted to one-and-a-half pints during the course and that the penicillin must be taken at least one hour before solid food. Tablets containing 20,000 units of the calcium salt and 0.5 gm. of citrate of soda were used. The above conditions would appear to make the oral route unsuitable for all except the most intelligent type of out-patient and on this account, and because of the obvious dangers of releasing this substance to the public, *de facto* if not *de jure*, the method cannot be recommended for general use.

*Tests of cure.*—In spite of the continuing efficacy of penicillin in gonorrhœa, this is no time in any way to relax our standards. Tests of cure should be started not less than one month after treatment and should, whenever possible, include repeated cultural investigations of urethral and cervical secretions in women and the prostatic-vesicular fluid in men. It should be remembered that, as well as a varying host factor in every patient, batches of commercial penicillin may still differ in potency and the human



element must still enter into their biological assay. Up to the present there is no certain evidence that the gonococcus is becoming resistant to penicillin as it has already to a large extent become to sulphonamides. There is, however, a growing tendency to raise the dosage and it is noticeable that in many cases the clinical response, although ultimately good, is not so rapid as it was two years ago. Sometimes complications such as arthritis or epididymitis occur after the discharge has ceased and the urine cleared, whilst on the other hand completely asymptomatic carriers of the gonococcus are occasionally revealed by prostatic or cervical cultures weeks after apparent clinical cure.

### SYPHILIS

*Arsenotherapy.*—As under active Service conditions not more than 50 per cent. of early syphilitics were able to complete orthodox treatment with arsenicals and bismuth, large-scale trials of intensive and semi-intensive schemes of arsenotherapy were undertaken both in the United States and Canada in 1941 and 1942. In these trials arsphenoxide (mapharside) was used exclusively, as what were considered to be therapeutically equivalent doses of neoarsphenamine were thought to be too toxic for the purpose. The minimal total dosage of arsphenoxide necessary to cure experimental rabbit syphilis has been calculated by Eagle and Hogan (1943). These workers have shown that the efficacy of the drug depends within limits upon the total dosage administered rather than upon the frequency of injection or the duration of treatment, and also that when bismuth is added to the treatment the efficiency of the latter is greatly enhanced. Time-toxicity relationship is shown to be important, the number of toxic effects increasing as the period of treatment is shortened. Hyperintensive courses, in which all the treatment is compressed into a period of five or ten days, were largely abandoned on account of a high incidence of both encephalopathy and granulocytopenia. The most popular semi-intensive course consisted of twenty daily injections of arsphenoxide and bi-weekly ones of bismuth (1 mgm. of the arsenical per kgm. body weight and 0.2 gm. bismuth metal). Many thousands of cases of early syphilis in the British, American and Canadian forces were treated on these lines and results in followed cases have been shown to be good. Severe toxic effects were not common, although encephalopathy and granulocytopenia occurred a good deal more frequently than with orthodox treatment, and for this reason it is emphasized that this method is not suitable for out-patient use. At Eagle's suggestion many clinics in the United States compromised by treating over 3000 early syphilitics as out-patients with tri-weekly injections of mapharside, up to an average total of 1,600 mgm. (21 mgm. or more per kgm. body weight) plus nine injections of 0.2 gm. of bismuth subsalicylate. The period of treatment averaged twelve weeks and the incidence of toxic effects was not unduly high, although four deaths occurred in a total of 4,823 patients in all

stages of the disease: 82 per cent. of the early cases who received at least 1,600 mgm. of mapharside and 1.8 gm. of the bismuth salt showed no signs of clinical or serological relapse twelve months after the start of treatment.

*Treatment of the toxic effects of arsenotherapy.*—2.3. dimercaptopropanol (British anti-lewisite:B.A.L.) originally developed as an antidote to arsenical blister gases, is now used in the treatment of severe arsenical intoxication (Peters *et al.*, 1945). It acts in virtue of its ability to combine with arsenic in the tissues, forming a stable thio-arsenite which is readily excreted in the urine. Ampoules of 2 c.cm. of a 5 per cent. solution of this compound dissolved in arachis oil containing 10 per cent. benzyl benzoate may now be obtained from the Medical Research Council, but it will soon be available through ordinary commercial channels. B.A.L. is injected intramuscularly and in the following dosage is said to have no appreciable toxic action:—Six four-hourly injections of one ampoule of the compound are given on the first day and thereafter one injection twice daily for a further five days. It must be remembered that post-arsphenamine jaundice is now thought to be caused by the virus of homologous serum jaundice carried by contaminated syringes, thus B.A.L. is not generally indicated in this condition.

*Penicillin.*—Since 1944, many thousands of cases of early syphilis have been treated with penicillin. During the war the recommended dosage in the British and American forces was 2,400,000 units (60 injections of 40,000 units three-hourly). It is still too early to foretell with accuracy the future fate of these patients, but from what is known about the disease and the manner in which it responds to other forms of treatment, it seems that an over-all relapse rate of not more than 10 to 15 per cent. is to be anticipated, and that, generally speaking, the earlier treatment was begun, the better the outlook (Moore, 1947).

The fact that commercial penicillin has been shown to contain undefined proportions of the comparatively inactive penicillin IV(K) has justified Harrison's decision of two years ago (1945) not to recommend its exclusive use in the treatment of early syphilis but to advise that one standard course of about ten injections of neoarsphenamine and bismuth be given in addition. It is known that as small a total dosage as 5 gm. of neoarsphenamine and 2 gm. of bismuth metal given concurrently will cure at least 70 per cent. of early syphilitics, although to advance this cure rate to over 90 per cent. it is necessary to give at least three such courses in less than twelve months. It seems that about 3,000,000 units of penicillin given over a period of about eight days is therapeutically equivalent to at least two courses of neoarsphenamine and bismuth, and in the present state of our knowledge the recommended method appears to be reasonably rapid and safe for treating early syphilis.

In this country it is generally impracticable for civilian patients to be admitted to hospital for treatment and it is now usual to give them not



47; Stokes and Steiger, 1946). Intrathecal injections of penicillin have been used by some workers, but there is as yet no proof that in neurophilis they are more effective than the usual parenteral injections.

### PRENATAL SYPHILIS

Because of its almost complete freedom from toxic effects and the short space of time into which adequate treatment can be compressed, penicillin is undoubtedly a most suitable agent for the treatment of this condition. Earle Moore (1947) considers it "incomparably superior to metal chemotherapy no matter how administered", and states that the results are equally good no matter what the duration of pregnancy at the time of treatment. He goes so far as to say that in such cases arsenicals and bismuth should be abandoned, and suggests that from four to six mega units given over a period of from eight to fifteen days will alone give optimum results. In this country opinion is still divided and I am of the opinion that, if the mother has had no previous treatment and especially if there is a possibility that her infection is less than five years old, it is probably safer, in addition to giving penicillin, to continue treatment with arsenicals and bismuth to term.

### CONGENITAL SYPHILIS

The clinical and serological response of infantile congenital syphilis to penicillin is generally as satisfactory as it is in the acquired secondary stage, and reports from the United States, where large numbers of cases have been treated and followed, indicate that a very low relapse rate is to be anticipated. Penicillin is well tolerated even by puny infants, and a minimal total dosage of 100,000 units per kgm. body weight may safely be given over a period of about fourteen days. At this stage, however, I am reluctant to rely on penicillin alone and prefer to give in addition at least six months' treatment with sulpharsphenamine and bismuth. I have recently seen a clinical and serological relapse in a child of ten months, who at the age of three months had been given no less than 900,000 units of penicillin in continuous three-hourly injections over a period of four weeks.

The place of penicillin in the treatment of late congenital syphilis is the same as in that of the later stages of the acquired disease and, in my view, it should be used in addition to, rather than in complete substitution for, other forms of treatment. Some encouraging results have been reported in interstitial keratitis, but the well-known tendency of this condition to wax and wane independently of treatment raises the question as to what extent the improvement was *post* or *propter hoc*.

### TOXIC EFFECTS OF PENICILLIN

Urticaria, either generalized or localized to the injection sites, is the principal, one might almost say the sole, side-effect of penicillin treatment.

It is particularly liable to occur with oil-wax suspensions but its occurrence should never interfere with treatment, as the condition can be controlled almost invariably by benadryl given orally in a dosage of 50 mgm. twice daily. It is not clear whether the urticaria is due to penicillin or to an impurity in the vehicle.

Leavitt (1945) in the United States, and McLachlan and Brown (1947) in this country have reported alterations in the menstrual cycle after penicillin as well as uterine bleeding and/or cramps in a high proportion of their pregnant patients. Spicer and Thomas (1946), on the other hand, have noted no abnormality in 1,300 women treated with penicillin for gonorrhœa, and only one alteration in the menstrual cycle among 100 female patients treated for syphilis with a correspondingly higher dosage. McLachlan and Brown consider these phenomena to be due most probably to some impurity in the penicillin originally available, and admit to a decrease in the numbers of such reactions during the last year. In my experience such disturbances have been few and far between and the faint possibility of their occurrence should never be a contraindication to penicillin treatment in the syphilitic pregnant woman.

#### CHANCROID

The great majority of true chancroidal infections, i.e., those due to Ducrey's bacillus, react well to sulphonamides. Sulphadiazine and sulphathiazole are equally effective, and a total of 30 gm. in six days is usually an adequate dosage. Fluctuating bubos should be aspirated repeatedly during chemotherapy and incision is rarely necessary. Ducrey's bacillus, though resistant to penicillin, is sensitive to streptomycin; this should facilitate the treatment of the occasional sulphonamide-sensitive patient when supplies of this still very rare substance improve. As streptomycin has no action in syphilis there would be no danger of masking that disease.

#### LYMPHOGRANULOMA INGUINALE

In its early stages this virus disease usually reacts well to sulphonamides. Medication with sulphadiazine or sulphathiazole in a dosage of 4 to 5 gm. daily for two weeks, or even longer, is generally necessary, and frequent differential white cell counts should be made after a total of more than 30 gm. has been reached, so that any consequent bone marrow damage may be revealed. The antimonial preparations, so useful in granuloma venereum (ulcerating granuloma of the pudenda), appear to have little or no action in lymphogranuloma. Penicillin has been found to give good results in the treatment of this condition (Willcox, 1946), but its use is not recommended on account of the danger of masking a concurrent syphilitic infection.

It cannot be too strongly emphasized that in all cases of apparently non-

syphilitic (dark field negative) genital ulceration or inguinal adenitis, blood tests for syphilis must be carried out at monthly intervals for at least three months before that disease can reasonably be excluded.

#### VULVAL AND PENILE PAPILLOMATOSIS

The most effective topical application for so-called "venereal" warts has proved to be a 25 per cent. suspension of podophyllum resin in mineral oil. The suspension is well shaken and applied liberally to all parts of the growths, care being taken that it does not remain long in contact with adjacent mucous surfaces. These can often be insulated by covering them with vaseline or zinc ointment, but in women, when the warts are near to or actually involve the introitus, it is best to keep the patient at rest in bed, so as to minimize the risk of the preparation "running" on to unprotected mucous membrane. At least two applications at intervals of forty-eight hours are necessary, the parts being washed with soap and water and carefully dried before each treatment.

#### References

- Batchelor, R. C. L., Donald, W. M. H., and Murrell, M. (1946): *Brit. med. J.*, **ii**, 151.  
 Bushby, S. R. M., and Harkness, A. H. (1946): *Lancet*, **ii**, 783.  
 Eagle, H., and Hogan, R. (1943): *J. ven. Dis. Inform.*, **24**, 33, 69, 159.  
 Harrison, L. W. (1945): *The Practitioner*, **155**, 223.  
 Leavitt, H. M. (1945): *J. ven. Dis. Inform.*, **26**, 150.  
 McLachlan, A. E. W., and Brown, D. D. (1947): *Brit. J. ven. Dis.*, **22**, 1.  
 Moore, J. E. (1947): "Penicillin in Syphilis," Springfield, Illinois.  
 Peters, R. A., Stocken, L. A., and Thompson, R. H. S. (1945): *Nature*, **156**, 616.  
 Romansky, M. J., and Rittman, G. E. (1944): *Science*, **100**, 196; *Bull U.S. Army Med. Dept.*, No. 81, p. 43.  
 Speiser, D. M., and Thomas, E. W. (1946): *J. ven. Dis. Inform.*, **27**, 20.  
 Stokes, J. H., and Steiger, H. P. (1946): *J. Amer. med. Ass.*, **131**, 1.  
 Willcox, R. R. (1946): *Post-Grad. med. J.*, **22**, 97.

# ADVANCES IN THE TREATMENT OF TUBERCULOSIS

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THE present attitude in treatment of tuberculosis has been well summed up at the recent Conference of the N.A.P.T. The main subjects for discussion were the bacterial aspect in the search for a specific and a safe immunizing agent, the human factor, and the true rehabilitation of the individual sufferer. These aspects are not, as they are sometimes held to be, in anywise contradictory. The bacterial specific when it is found will eradicate the bacillus, and incidentally remove sources of infection, but it will not remove or alleviate the causative factors inherent in our social system, which are both psychological and physical; nor will it deal with the end-results of destroyed vital capacity and provide work for the disabled.

## CHEMOTHERAPY

Efficient chemotherapy has been the aim of all research workers in tuberculosis since our organic chemists produced the aniline dyes in the eighteen-eighties. The term chemotherapy has now a much wider definition than its original, given by Erlich, which confined it to the action of purely chemical substances on tissue cells, and of drugs on specific disease organisms. It has come to include *antibiotics*, which are the products of organic compounds of the constituents of these organisms; it also includes substances which have a secondary effect on diseased tissue, resulting from a primary action on the natural cellular mechanisms of defence. This last approach is, after all, but an attempt to hasten artificially the known natural effects of rest and hygienic conditions on the reduction of symptoms, and on the increase of natural defences. Its failure so far has been the main support of those who preach their continued faith in normal sanatorium routine.

There is no doubt that Koch set back much work in the search for the specific agent by his advocacy of the curative value of old tuberculin in 1890. Moreover, as it fell into disrepute it had a further bad effect, as it endangered the whole theory of immunotherapy, which did not recover properly until there was a slight change in the approach to the theory with the appearance of B.C.G. Nevertheless, work on both lines proceeded in the background. The former was energized by the discovery of the effect of penicillin on gram-negative bacilli; the latter by the accumulating evidence of the dangers of contact in tuberculin-negative reactors among children, and later among nurses and medical students entering general hospitals, and by the theory that pulmonary tuberculosis is but the continuance of, or endogenous re-infection from, a primary focus.

In the nineteen-thirties *gold treatment* had an over-fashionable vogue in this country. In those days the most extravagant claims on insufficient evidence of efficacy, even in experimental tuberculosis, were all too common, and it was little wonder that false hopes led to unreasoning despair. Sano-crysin and its variations were used in acute disease with disastrous results in skin and kidney complications. Now it has almost completely disappeared, and yet, if used wisely, with proper controlling glucose, it seems to have real value in the case with recent exacerbation of an old-standing fibrotic lesion. We may therefore yet see a return to some less toxic modification of Möllgard's (1924) original sodium auro-thiosulphate. Similarly we may see old tuberculin used more frequently in eye and genito-urinary lesions, in the occasional case of Poncet's tuberculous rheumatism, and in the control of exercise in the resting-afebrile, ambulant-febrile patient with bilateral fibrotic pulmonary tuberculosis not amenable to continued rest or to modern methods of collapse therapy.

None of the sulphonamides has so far had success in controlled clinical trials. Feldman and others at the Mayo Clinic found that *promanide* (promin) can inhibit extension of disease artificially produced in guinea-pigs and, as the drug has a low toxicity in the animal and is easily soluble, there were at first great hopes of its success in pulmonary tuberculosis. Unfortunately, man showed much less tolerance, whilst complications, and especially anæmia, were so severe to what was considered to be ample dosage that it had to be abandoned. Results of controlled trials on its modifications, diazone and prominole, have never been published, but it is said that they cannot eradicate infection even in artificially produced lesions. Yet they do appear to have a decided effect in controlling early exudative disease, and to effect acceleration of the betterment expected by more conservative methods of treatment in laryngeal and epiglottic tuberculosis in man. Some derivative of the sulphone group may yet succeed in getting past the fibrotic and caseating boundaries of the usual productive lesions of adult pulmonary tuberculosis, in spite of Hinshaw and Feldman's (1944) conclusion that they have so far no definite place in treatment.

Some hope of passing the fibrotic boundaries is given by Anderson's (1943) work on *lipid soluble substances*, and a new line of attack may be opened up by the successes seen in lupus vulgaris from the administration of *calciferol* (Dowling and Thomas, 1947), should we be able to find an antidote to the effects of accumulation of the drug in body tissues.

*Streptomycin* is, however, the main present hope of the clinician and of the general public, who have come to think of it as the penicillin of tuberculosis. It has already been proved to be of low toxicity to animals with experimental tuberculosis, and not only can it inhibit the growth of such disease, but can even cure it. On the other hand, we have now realized, as we did not do in the days of gold treatment, that artificially produced disease in the guinea-pig is not the same thing as adult pulmonary tuberculosis in man, and so have approached clinical trials with severe, if enlightened,



criticism. The communication made by H. C. Hinshaw to the recent N.A.P.T. Conference has summarized the views of the Mayo Clinic:—

Streptomycin is a chemical substance which modifies tuberculous disease in experimental animals and in some human forms. About 1000 patients have had complete courses of treatment and a further 600 are now under observation. Unfortunately the average strain of bacillus, sensitive to the drug at first, tends to become drug-fast after several weeks, whilst a further limitation to its use lies in the pathology of the productive lesion. Acceptable cases fall into those with bad prognosis on modern standards, cases of bilateral acute disease not considered suitable for collapse therapy, cases with recent exudative lesions, and those with constitutional upset that bears no relation to the amount of recognizable involvement. Its use is justified in meningitis because some cases have recovered completely, even though others are known to have relapsed and a certain number have shown serious cerebral complications. In miliary tuberculosis it has reduced mortality from 100 to 50 per cent. It has been effective in severe exudative laryngitis and pharyngitis, and in progressive ulcerative tracheo-bronchial disease, and its use is recommended in acute tuberculous ulcerative enteritis. It is apparently ineffective in chronic fibroid disease, and it should not be used in the minimal lesion with good prognosis, where it should not replace already well-tried methods.

#### B.C.G. IMMUNOTHERAPY

The claims of French, Norwegian and Swedish physicians on the efficacy of B.C.G. (*Bacille Calmette-Guérin*) has again centred attention in this country on immunotherapy, and through it on the grave problems connected with the primary lesions of childhood and adolescence. If Brieger's (1944) contention in "The Papworth Families" is true, that adult disease is "a direct, continuous but insidious growth of the initial lung lesion", then contact infection at any age is a much wider matter than a consideration of infant mortality from massive infection in the tuberculous home. The contact at any age must be controlled, even if symptomless, especially the child contact. Although there is no proof so far that liability to breakdown does not act through a Mendelian recessive characteristic, and though we are still puzzled by the dangers of infection to a nurse who is a sib of the patient, we have ceased to lay stress on hereditary, racial and familial tendencies and have concentrated on the theory of direct infection. In any event, the fact remains that no child born of a tuberculous father in Papworth has, while living there, developed any serious clinical form of the disease. Where, however, the child cannot have the controlled conditions of a Papworth, the advocates of B.C.G. say this should be given. They say that only B.C.G. has given recognizable immunity, together with safety in administration, to infected babies, and that by its use we may hope to give sufficient immunity to prevent natural infection up to the age of three, and sufficient resistance to overcome subsequent natural infections until they in their turn will bestow natural immunity. From this its advocates go on to say it should be given to adolescent and young adult tuberculin-negative reactors, who have had no contact with open cases or have lost their immunity. This applies particularly to nurses and medical students entering general hospitals.

The approach to B.C.G. is still cautious in the U.S.A. and in Great Britain, in spite of the results of Heimbeck's (1936) admirably conducted researches in Oslo. He has shown that morbidity and mortality can be definitely reduced in the vaccinated tuberculin-negative reactors as against the unvaccinated, although he admits that both are still on a higher level than is found in naturally infected positive-reactors. Now we have got so far as to plead for a properly controlled investigation in this country, it is to be hoped that the advocates of the Vole bacillus vaccine, however good they say it is, will not push their claims against those of B.C.G., in which event we might well find ourselves in a difficulty comparable to that created by old tuberculin.

#### THE VALUE OF EARLY DIAGNOSIS

Other workers, however, say they are not impressed by immunotherapy. They pin their faith for the future control of the tuberculin-negative reactor on efficient re-examination at frequent intervals. Their leading protagonist is Myers (1945), in his work in the grade-schools of Minneapolis.

He found that in children round the age of six the percentage of positive reactors fell from 22 per cent. in 1926 to 2.1 per cent. in 1944; the comparative figures at age fourteen were 70 per cent. and 12.5 per cent. With this he links a fall in mortality in the twenty-five years 1920-1945, from 120 to 27.1 per 100,000. He believes both falls are due to early treatment of adult sufferers so that they do not become sputum-positive carriers, isolation of the infectious, eradication of bovine tuberculosis, and the intensive search for sources of infection.

He advocates that tuberculin testing should be continued in school children to the age of fourteen, and that all positive reactors between the ages of twelve and fourteen should be X-rayed annually, whilst all above that age should be X-rayed every six months.

Myers is not afraid of primary adolescent tuberculosis; he says it is no more dangerous than primary infection in children, and that it does not lead to more adult pulmonary tuberculosis than is seen in the naturally infected child with a Ghon's focus and a natural positive reaction. If his belief was held by the parents of prospective nurses and domestics for the Tuberculosis Service there would not be the present difficulty in staffing sanatoria. Myers believes that the duty of the tuberculosis physician is to lower the incidence of infection and worry less about attempts to heighten resistance by vaccination. The answer of his critics is that his ideas may be practical in a small community, but quite inadequate for countries of the size and density of population of Great Britain. However this may be, advances may be expected here in earlier diagnosis of the early lesion by extension of facilities for miniature radiography of the supposedly healthy, and in the proper rehabilitation of the moderately advanced and the chronic sputum-positive case not amenable to modern methods of collapse therapy. There seems to be no other immediate hope of dealing with this continuing scourge. In 1945 there were 23,000 deaths, 207,000 cases under observation, and 50,000 new cases on the register, whilst 80 per cent. of admissions to sanatoria were still in stage two or stage three.

The results of *mass radiography* surveys to date show there is much more morbidity and mortality than notification and death registrations would lead us to believe. They show there are two peaks of incidence of active disease, in the age-groups 17-24 and 35-39, where there are at least 3 per 1000, whilst another 5 per 1000 show evidence of lesions that are either old or smouldering, and so require some months of observation before final opinion on the necessity of treatment can be pronounced. In the later age-group are many cases with fresh lesions and no evidence of previous parenchymatous disease. After the age of forty the incidence of active disease rises rapidly. There is no doubt that large numbers of people with positive sputum, and therefore potential sources of massive infection, are never diagnosed over the age of thirty; if they are diagnosed they are certainly not notified. Therefore if this continuing plague to the community is to be controlled, every "chronic bronchitic" over the age of thirty-five must be considered to be a potential carrier of the bacillus until he is proved otherwise by examination that includes a miniature film of his chest.

#### SANATORIUM TREATMENT AND REHABILITATION

In present circumstances we cannot give residential treatment to all those who would be found to require it by such methods of intensive search. We could, however, give advice on the protection of contacts, and concentrate on the efficient treatment of the early case at economic ages. In the long run the duty of the sanatorium to the individual will outweigh the advantages of its public health function in segregation of the advanced case, and it is the duty of every physician to contribute to the education of the public on these lines in our present desperate shortage of accommodation in chest hospitals and sanatoria.

The end-results of residential treatment and consequent return to the conditions of normal life and industry are well known: 60 per cent. of those with moderately advanced disease at admission are dead within five years, and most of them within two years of the date of discharge. Yet this country is spending at least £12,000,000 a year on tuberculosis. We are increasing the life of many sources of infection, and returning to the community many cases similar to those we wish to find by mass radiography. The reason why these cases will continue to infect their colleagues is that ostracism compels an asocial attitude, and they must provide for themselves and their dependants. On a purely material basis it must be admitted that large numbers of people are being killed off who could contribute to the national economy in sheltered industry. We must therefore have an immediate advance in treatment in a new attitude to our fellows who are suffering from a disease which they contracted through no fault of their own.

There is good reason to believe that we shall see this advance within the next few months when the Ministry of Health in conjunction with the Ministry of Labour will put into operation a scheme of proper rehabilitation with adequate allowances for the tuberculous "patient-worker". Such a

scheme would not replace aid given under 266/T or its post-war alternative: it would follow it. By a humane extension of the powers open under The Disabled Persons Employment Act (1944) the breadwinner of the family would be given sufficient to support them while he was learning a trade, during treatment, over that dangerous period of two years following discharge from the sanatorium. By this trade he would be enabled to regain his self-respect by knowing he need not depend upon charity, and would prepare himself for that return to family and community life which is the true end of all treatment. Those who became fit for a day's work of six or more hours could enter a "remploy factory" in their own area, or be accommodated in a village settlement. Those who prove unfit to reach this standard should be given work at home under The Disabled Persons Employment Corporation. Something approaching an adequate pension should be available for those totally unfit for any work.

This advance is due to a new realization of the humane end of treatment as something beyond mere routine and mechanical intervention, and is closely bound up with the recent interest in the psychology of the tuberculous. Much is now being written about the rôle of the social worker, the occupational and art therapist, the psychologist and the neuropsychiatrist in the sanatorium. All have their place, provided they are under the immediate direction of the physician in charge. If they are allowed to become entities they will produce still more disunity where there are already too many arbitrary divisions from prevention in the hands of the Medical Officer of Health to job-finding in the hands of the District Resettlement Officer. Moreover, there is a danger that they may be considered as a substitute for, rather than as a complement to, religion. Every sanatorium physician knows the value of an understanding minister of religion to the patient and to himself. Aspirin compounds and barbiturates, astrology and psycho-analysis may replace him in the outside world, but not in the sanatorium which has learned that a planned security, first-class surgery and a perfect routine are but half-way to happiness. A combination of the disciplines of medicine and religion are essential to the renewal of the patient, who is all too often admitted in a state of desolation and defeat, albeit hidden under the thin cover of *spes phthisica* or the fierce assertiveness that comes of fear of future insecurity and ostracism.

### References

- Anderson, R. J. (1943): *Yale J. biol. Med.*, **15**, 311.  
 Brieger, E. M. B. (1944): "The Papworth Families," London.  
 Dowling, G. B., and Thomas, E. W. P. (1947): *Lancet*, **i**, 919.  
 Feldman, W. H., and Hinshaw, H. C. (1944): *Proc. Mayo Clin.*, **19**, 593.  
 —, — (1945): *Amer. Rev. Tuberc.*, **52**, 299.  
 Heimbeck, J. (1936): *Tubercle*, **18**, 97.  
 Hinshaw, H. C., and Feldman, W. H. (1944): *Amer. Rev. Tuberc.*, **50**, 202.  
 Möllgard, H. (1924): "Chemotherapy of Tuberculosis," Copenhagen.  
 Myers, J. A., Harrington, F. E., and Suarez, E. G. (1945): *J. Amer. med. Ass.*, **128**, 852.

# ADVANCES IN THORACIC SURGERY

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It is my purpose to outline the trend of thoracic surgery and to concentrate particularly on the developments which have accrued since Tubbs wrote upon this subject in *The Practitioner* in 1943. The references will help those who require special or detailed knowledge.

## THE LUNGS

Fifty years ago most of the procedures which are now advocated in the management of *pulmonary tuberculosis* had already been devised (Kcers, 1946); but it is only recently that they have been brought to such usefulness that they are accepted as beneficial, and that their relative indications and limitations are understood. One by one these and a number of other procedures based upon rest, relaxation, or excision of the tuberculous tissue have been revived and improved to such an extent that, if patients who contract pulmonary tuberculosis could be treated according to existing knowledge, this disease which kills so many young people might be controlled. But the application of modern methods is a broad national problem of which thoracic surgery is only a part. It is chiefly concerned with one particular phase of pulmonary tuberculosis, namely, that in which a cavity or cavities develop in the lung. The figures quoted below show that the prognosis is bad indeed unless the cavity heals, and they show that conservative measures *alone* have little or no chance of achieving this end.

Barnes and Barnes (1928, 1933) found that 85 per cent. of 1,454 patients who had cavities were dead in three years when treated by rest in bed; Thompson (1943) followed up 406 adults and found that 64 per cent. were dead in three years and 75 per cent. in five years. If patients be treated by rest in a sanatorium the results are hardly improved, for only 15 per cent. of cavities close under these conditions.

Thus, a patient who has a tuberculous cavity in the lung not only stands in danger of his life, but, since the lesion communicates with the bronchial tree, he is a persistent source of infection to others.

Early attempts to control tuberculous cavities by surgery were only moderately successful because the pathology of the process was not understood, and thus many of the advances which have been made recently are concerned with this subject and with the mechanics of cavitation (Eloesser, 1934; Coryllos and Ornstein, 1938; Monaldi, 1939; Price Thomas, 1942). Three fundamental points have emerged: first, that secondary infection of tuberculous cavities occurs late in the disease; secondly, that practically all are tension cavities from their inception and remain so until late in the disease; thirdly, that cavities heal when their draining bronchi close. Modern relaxation methods are based upon these observations.

Only a few points which govern relaxation therapy can be mentioned. As a method of treatment it will probably remain unchallenged until some potent antibiotic has been discovered. The value of streptomycin is not yet determined, but promin, and allied drugs, have been disappointing except as local applicants.

There is a right and a wrong time for applying any active treatment in pulmonary tuberculosis. As a rule only those patients who manifest general and local resistance to their disease can be assisted to cure themselves; but if the dossier of almost any hopeless case be examined it will be found that a time did exist at which surgical treatment could have changed the march of events. Price Thomas and Cleland (1943) have shown that the best surgical results are achieved in the early cases, and the worst in the "slipping chronics".

Many *early* lesions, both at the apex and at the base of the lung, respond well to *phrenic paralysis* (Hope Gosse, 1947) and this operation can often be usefully supplemented by pneumoperitoneum (Banyai, 1945; Keers *et al.*, 1947). The phrenic nerve is hardly ever paralysed by avulsion nowadays; the modern operation is a crush, associated with division of the accessory phrenic nerves. If the patient benefits, the operation can be repeated if or when the nerve regenerates.

The most usual treatment of cavitation is by the induction of an *artificial pneumothorax*, but only about 15 per cent. of patients get a perfect artificial pneumothorax without surgical aid. In the other 85 per cent. the diseased area is held to the chest wall by adhesions and a contra-selective collapse is achieved; if this is maintained the results are disastrous (Ustvedt, 1942). Fortunately adhesions can often be divided by cauterization, and large series of cases have been reported (Brock, 1938) proving the operation to be safe and the results good. The complications of the operation are infinitely less serious than the complications of a bad artificial pneumothorax. If an artificial pneumothorax cannot be induced, *extrapleural pneumothorax* may be indicated (Roberts, 1938; Sellors, 1938). Much debate still exists as to the place and value of this operation, but Reid (1946) has shown that it may be indicated as a precursor to thoracoplasty, and others feel that it can help patients suffering from bilateral apical disease, and children who are too young for extensive rib resections.

When attempts to secure selective relaxation of the diseased areas have failed, most patients should be considered for *thoracoplasty*. The indications for, and the technique of, this operation have recently been perfected by Holst, Semb and Frimann-Dahl (1935), by Price Thomas (1942) and other surgeons, so that the deformity which results is minimal and the expectation of cure is good. The modern operation differs from its predecessors in that concentric relaxation of the upper lobe towards the hilum, such as obtains in a perfect artificial pneumothorax, is achieved by resection of ribs associated with extrafascial or extrapleural apicolysis. Rib resection without apicolysis

produces only lateral compression of the lung and does not lead to such a high incidence of cavity closure.

Overholt (1941) has reported a consecutive series of 874 patients in whom 1,898 thoracoplasty operations were performed with a mortality of 5.3 per cent.; 94 per cent. of the survivors were alive, well, and sputum-free five years later, and 83 per cent. were working.

Other methods of treatment are under investigation. Monaldi (1939) introduced *cavity drainage* by catheter and continuous suction. This has been tried in England and found to be disappointing (Maxwell and Kohnstamm, 1943; Sellors, 1942) but careful comparison of the indications for operation and the techniques used has not yet been possible. Monaldi has recently reaffirmed his claims (for reviews of this subject see *Archivio di Tisiologia*, 1947, Vol. 1 and 2.) and it is apparent that the matter is still *sub judice*. The best results have been obtained in the case of large tension cavities in patients too ill to undergo thoracoplasty. Hopeful results have also been achieved in some cases by the French operation of speliotomy, or drainage by de-roofing, and by *lobectomy* and *pneumectomy* as first practised by Americans.

Overholt *et al.* (1946) recorded 192 patients in whom 200 resections were performed; many were suffering from hopeless or advanced disease and a surprising number have been successfully treated.

Lobectomy and pneumectomy should be considered when all other treatments have failed, and most thoracic surgeons agree that good results can be achieved in carefully selected cases.

*Bronchiectasis* is another disease which is often treated by surgery; if it is allowed to persist it can be so intolerable that life ceases to be worth living. But children are seldom crippled by its ravages, and since the mortality is low between the ages of five and twenty, surgical treatment is often deferred in the belief that time may cure the lesion. In fact, bronchiectasis is a greater menace in middle life than in youth, and may be incompatible with old age; it can be cured safely in young people whereas in old age it is incurable. Once acquired the disease is generally permanent and sometimes progressive, but recent investigations (Lee Lander, 1946) have shown that dilated bronchi alone—such as are shown by bronchograms—do not constitute permanent bronchiectasis, for dilated bronchi are found in patients suffering from temporary atelectasis. It follows that before surgical treatment is recommended the lesion must be known to be permanent and irreversible, and the only way of being certain of this is to study serial bronchograms.

Bronchiectasis can only be *cured* by lobectomy or pneumectomy. Conservative measures, including postural drainage, remedial exercises, vaccines, sulphonamide drugs and penicillin (Findlay and Sweet, 1947) may control attacks of "pneumonitis" but do nothing to abolish the cause of these attacks. There are records of patients who have been treated medically (Perry and King, 1940; Riggins, 1941; Roles and Todd, 1933) and they

Now striking differences in the results to be expected. In contrast to this there is little doubt that the results of surgery are good provided all the diseased tissues can be removed, and provided the lesion has not been present for so long that persistent coughing of infected pus has caused bronchitis and emphysema in other parts of the lungs. Mead *et al.* (1947) have described a series of 236 consecutive lobectomies with only one operative death. Pneumonectomy is more serious than lobectomy but it is well tolerated by children and young adults and leaves no disability from lack of lung tissue; indeed, removal of a suppurating pulmonary lobe or lung generally improves the vital capacity of the patient.

The advances of recent times are largely in points of technique which secure primary healing of the bronchus (Belsey, 1946) and which avoid empyema in convalescence; the substitution of dissection of the hilar structures for the tourniquet operations which used to be performed; the intrapleural and systemic use of penicillin and sulphonamide drugs; the routine use of blood transfusions during the operation; the methods which have been devised to avoid or minimize post-operative atelectasis, and the pre- and post-operative use of remedial and breathing exercises.

Apart from these, two principles have been accepted. First that no operation can be contemplated until perfect bronchograms, demarcating all broncho-pulmonary segments of both lungs, have been secured; to neglect this advice is to run the risk of poor results in treatment. Secondly, that segmental lobectomy is a proper operation. Bronchiectasis often involves parts of lobes leaving other segments unaffected, and in the past it was necessary in such cases to sacrifice normal tissue in order to excise all the abnormal; Pilcher (1946) and others have proved that individual broncho-pulmonary segments can be taken out; and thus many patients with diffuse bilateral disease can be treated surgically.

Bronchiectasis must be distinguished from other forms of pulmonary infection such as "pneumonitis" (Coope, 1946), which is a term used to cover any non-specific inflammation; *pulmonary suppuration* (Sellors *et al.*, 1946), a clinical term which describes certain pyogenic inflammations, and *pulmonary abscess* (Barrett, 1944), which is applied to any collection of pus contained within a cavity in the lung. These vary in etiology, course and treatment, and can no longer be lumped together under one convenient omnibus called "pneumonia", nor can they be treated by a simple routine of sulphonamide drugs and penicillin. The trend of modern work is to separate lung infections into entities, in much the same way as inflammations in the hand have been worked out, and to treat each one according to a specific programme. The differential diagnosis is made by studying the history, and especially the mode of onset of symptoms, the bacteriology of the sputum, serial skiagrams, and bronchoscopy. A few examples of the practical application of this policy may be quoted:—

The traditional treatment of anaerobic or foetid lung abscess by medical means has given place to early surgical drainage (Neuhof and Touroff, 1940, 1941, 1942)



when brief trial of conservative measures has failed. Fœtid abscess itself has been distinguished from aerobic or non-fœtid abscess; the essential difference being that in the former a slough of lung often persists in the cavity and when this happens drainage is essential to remove the foreign body. Staphylococcal abscess, such as may complicate septicæmia or staphylococcal pneumonia, is an example of the non-fœtid type, and one in which conservative measures are indicated. Other types which have so far been separated are Freidlanders', amœbic, actinomycotic, and bronchial abscesses.

These conceptions have been due to three types of investigation. Surgeons have operated upon lesions at all stages in their evolution and have been able to correlate the clinical, the post-mortem and the laboratory findings; radiologists have shown that serial X-rays and tomograms can be interpreted in the light of this experience, and researches into the segmental anatomy of the lungs have explained the distribution of the lesions and guided surgeons in their treatment (Brock, 1942, 1943, 1946; Appleton, 1944; Foster Carter, 1942, 1944).

Another development has been the general appreciation of the ultimate dangers to life of chronic lung abscess and of spreading pulmonary suppuration; there is no cure for some of these ills except surgical excision of the affected parts, and the hazards of the operations have been importantly tempered by sulphonamide drugs and penicillin.

The treatment of *bronchial tumours* constitutes a great part of thoracic surgery, for, as yet, there is no substitute of equal worth. The key to success is early diagnosis, and this can be achieved by heeding the warning signs and by thorough investigation of all suspected cases. X-rays, bronchoscopy, and examination of the sputum for malignant cells should become matters of general application. About 5 per cent. of bronchial tumours are innocent; 90 per cent. of malignant tumours affect the main bronchial system, whilst 10 per cent. are "peripheral". The importance of the malignant group is that in men carcinoma of the bronchus is almost as common as carcinoma of the stomach and the expectation of life after the first symptom averages about one year. The "innocent" tumours are not so harmless as the name implies; they either may become malignant or induce serious complications in the lung or the pleural cavity; but the expectation of life is relatively long and the age-group affected is young adults as opposed to old people.

The most common simple tumour is *adenoma of the bronchus* (Foster Carter, 1941). This tumour may start as an intrabronchial mass but it penetrates the bronchial wall by local invasion and endoscopic treatment does not eradicate the extrabronchial part; the differential diagnosis between adenoma and carcinoma can only be made on biopsy and by a skilled histologist, and as many patients are diagnosed as suffering from carcinoma some are denied the operation which could cure them. Surgical removal of the tumour by dissection lobectomy or pneumonectomy is the correct treatment, it should be applied as soon as a diagnosis has been made. Just occasionally an adenoma can be excised from the bronchus and the defect made good with a fascial graft; Belsey (1946) has described a remarkable case in which he totally removed a long segment of trachea and successfully bridged the gap with a spiral of steel wire over which he placed a fascial graft. By comparison with adenoma other simple tumours are rare but examples of chondromas (Davidson, 1941), hæmangiomas (Whitaker, 1947), and hamartomas (Harrington, 1945) have recently been described.

*Carcinoma of the bronchus* is the common malignant tumour, and it is well to remember that it was in 1933 that Graham achieved the first successful pneumonectomy; his patient is still alive. Until then there was no hope, and although the general prospects are still poor, improvements are made every year. Brock (1943) and Tudor Edwards (1946) have given frank descriptions of the surgical outlook in this disease.

When malignant growths cannot be removed, radiotherapy (Hilton, 1945) offers palliation for some cases, but good results can be expected only if the patient be treated by a therapist who is expert in this field. Other lines of research which are still in the experimental stage are injections of nitrogen mustard or urethane.

Some malignant growths present in X-rays as circumscribed shadows and these must be distinguished from pulmonary metastases and hydatid cysts. *Pulmonary hydatid disease* is by no means uncommon; a series of 30 cases in which the parasites were acquired in England has recently been reported (Barrett, 1947).

#### THE MEDIASTINUM

*Superior vena cava obstruction* is commonly an indication of secondary malignant disease, Hodgkin's disease or some abnormality which ends fatally; but, apart from thyroid adenomas, other simple conditions can produce the same effect. Spontaneous thrombosis, comparable to that which occurs in the axillary vein, has been described, and in this the outlook is good. In 1946, Tubbs described a state of benign, idiopathic fibrosis affecting the superior mediastinum in which the great veins are completely obliterated by fibrous tissue. The symptoms and signs come on gradually and an extensive collateral circulation develops; no surgical treatment is of avail, but the patient may live for years.

*Dermoid cysts and teratomas* (Rusby, 1944; Hueur and Andrus, 1940; Barrett and Barnard, 1945) are mentioned to stress these points: that first, if treated conservatively, these tumours often become infected and may discharge hairs and sebaceous material into the bronchial tree. Secondly, that any tumour lying against the aorta or the pericardium can, and usually does, show transmitted cardiac impulse; and thirdly, that early surgical removal by thoracotomy is indicated in all cases.

*Myasthenia gravis* is a serious neurological disease in which the patient suffers from progressive paralysis affecting at first the face, the eyes and the muscles of deglutition, but leading eventually to paralysis of respiration. Operations and necropsies have shown that in this disease the thymus persists and is larger than usual, although histologically it is practically identical with the normal; in about 15 per cent. of cases a benign or malignant tumour is found. The prognosis of conservative treatment is poor, although fluctuations in the course of symptoms are usual and the disease may remain stationary for long periods of time. Prostigmin, which was introduced by Margaret Walker (1934), has done much to ease the burden of these patients

but never cures the disease and may become impotent to relieve the paralyses. The surgical treatment is thymectomy. Blalock (1939, 1941, 1944) and Keynes (1946) have reported their end-results in more than 100 patients. These results can be summed up as follows:—

The operation itself is not difficult but success rests upon the pre- and post-operative treatment; the signs and symptoms may disappear quickly after operation but more often there is a gradual return towards normal; about 35 per cent. of patients are likely to be cured, whilst about 35 per cent. derive great benefit but require a small maintenance dose of prostigmin. The favourable patients are the early ones and those who are not in fact suffering from a tumour; apart from the few who die from the operation none are made worse.

A *thymoma* is easy to remove but few malignant tumours are operable and there is no certain way of distinguishing between the two except by operation; most thymic tumours are not associated with myasthenia gravis.

*Pick's disease*, or restrictive pericarditis (White, 1935), is a crippling abnormality which can often be so relieved by surgery that patients who are bedridden can return to an active and useful life. The pericardium becomes transformed from a delicate elastic envelope into an unyielding calcified sac which restricts the heart, prevents filling of its chambers, and leads to venous, portal and pulmonary congestion: the patients develop pleural effusions, ascites, and eventually die from congestive heart failure. The etiology is still *sub judice* but some cases (and perhaps all) are due to chronic tuberculosis (Ellman, 1945; Sheldon, 1946; Kopelman, 1947).

The surgical treatment (Sellors, 1946) consists in removing part of the abnormal pericardium; it is not necessary to take more away than that which lies in the front of the heart and over the left ventricle. It has been found dangerous to free the right side of the heart before the left, to free the points at which the vena cava enter the pericardium, to remove the calcified tissue from the auriculo-ventricular groove or to uncover the auricles. The operation is easily performed through a left lateral thoracotomy, and the dramatic relief which many patients experience more than justifies the dangers which must sometimes be faced.

Interest in the surgery of the chambers of the heart has been stimulated by Harken and his associates, who during the recent war successfully removed more than 100 foreign bodies from within the heart, the pericardium and the great vessels. Experiments are now in train to test the possibilities of intracardiac operations upon patients with valvular disease.

The first surgeon to ligate, and so to cure, a *patent ductus arteriosus* was Gross (1939). This operation has now passed the experimental phase and good results have been recorded from all quarters (Hunter, 1946; Blalock, 1946). It is indicated in children as soon as the diagnosis is made, and it is justified because the mortality of the operation is small, the cure complete, and the risk of subsequent malignant endocarditis, from which at least 25 per cent. of patients succumb if untreated (Maud Abbott, 1936), is removed. This much is generally known, but in 1941 Tubbs made another startling advance:—

He published the records of a case of *patent ductus arteriosus complicated by malignant endocarditis* and stated that a complete cure of both conditions had been achieved by tying the ductus. Two years later he was able to report that 5 patients

out of 7 had survived and were cured; this had been achieved without penicillin. Tubbs stated: "The effect of successful ligation in infected cases was most dramatic for the fever immediately abated. . . . The blood became almost or completely sterile within a matter of minutes".

Every patient who survives operation has been rescued from almost certain death. Apart from the addition of penicillin and sulphonamide drugs the chief development during the last few years has been one of technique. To avoid any possibility of recanalization Gross (1944) and Crafoord (1944) both advocate dividing the ductus between clamps as opposed to ligation of the vessel in continuity.

In 1945 Blalock and Taussig first reported an operation for the relief of *Fallot's tetralogy* and other forms of *congenital pulmonary stenosis*. The basic abnormality in these conditions is that sufficient blood cannot reach the lungs because the pulmonary arteries are narrowed. The defect is serious and few patients survive childhood unless the ductus arteriosus remains patent. The lesion can be diagnosed; it affects infants and children, and the patients are cyanosed and show polycythæmia, clubbing, dyspnoea, cardiac murmurs as well as typical radiological and electrocardiographic findings.

A possible remedy lies in anastomosing one of the large systemic arteries, such as the left subclavian, to the left pulmonary artery and so shunting some of the systemic blood back into the lungs. Blalock has recently published an analysis of his results in 450 operations (1947). The patients ranged in age from four months to twenty-six years, but the ideal surgical age is stated to be three to ten years. Under the age of two the difficulty of the procedure makes the mortality high. The total mortality in the first 243 cases, including all cases in which the operation could not be completed, was 21 per cent. and the mortality in the second 100 patients was 15 per cent.; it was 9 per cent. when an anastomosis between the subclavian and the pulmonary arteries was possible. Children who survive are found to have values for arterial oxygen saturation of 75 to 80 per cent., they are not cyanosed and their exercise tolerance is much improved. None has as yet developed endocarditis. It is too early to evaluate this procedure but it is a technical triumph and one which has already opened up new possibilities.

Another advance in the surgery of congenital abnormalities of the great vessels comes from Stockholm where Crafoord (1945, 1947) and his colleagues have developed a practical technique for the treatment of *coarctation of the aorta*. Gross described a similar operation at about the same time. The patients who can be treated surgically are those in whom the aortic stricture lies immediately distal to the origin of the left subclavian artery.

Crafoord excises the stenosed segment and performs an end-to-end anastomosis of the aorta; the operation is possible because a collateral circulation to the trunk is already present and because the aorta can be clamped before division in such a way that the circulation to the brain is maintained throughout the operation. Up to the end of 1946 he had operated upon 15 patients and only two of these had died; his work has been confirmed, and in England several surgeons have successfully followed his lead.

*Aneurysm of the aorta* still presents difficult surgical problems but Alexander (1944) reports the case of a young man suffering from a congenital aneurysm of the descending aorta which he excised, having ligated the vessel above and below. The patient recovered from this operation.

*Carcinoma of the œsophagus* (Grey Turner, 1946) continues to occupy the

attention of surgeons. This disease can be treated palliatively by endoscopic intubation, gastrostomy, or radiotherapy, but surgeons have always been hopeful that cures might be achieved if the growths and their immediate lymph field could be removed. To-day the technical difficulties of the surgical approach, the excision, the anastomosis, and the repair have largely been overcome, and not only have successes been achieved (Garlock, 1944, 1947; Churchill and Sweet, 1942; Yudin, 1944; Allison, 1946; Lewis, 1946) but the operative mortality and the morbidity have been reduced to reasonable proportions.

The great differences between the modern operations and those performed ten years ago are the techniques which have been devised for excising growths at all levels, and the realization that continuity of the gut must and can be restored by anastomosis in the mediastinum. Garlock's operation (1947) for carcinoma in the vicinity of the aortic arch is a good example; he removes the growth and anastomoses the fundus of the stomach to the œsophagus in the superior mediastinum; this is achieved by laying the stomach lateral to the aortic arch. In spite of these improvements carcinoma of the œsophagus remains a deadly disease and the late results are not good, because many patients are far advanced when first seen by a surgeon. For the latter group, in whom inability to swallow food or saliva is the principal misery, Allison (1946) has devised a technique for short-circuiting the obstruction. The hopeful cases are those in which the tumour involves the lower third of the œsophagus, the cardia, or the fundus of the stomach, and one of the most striking developments of thoracic surgery is that this group should be approached by thoracotomy and incision of the diaphragm, rather than by laparotomy. This trans-diaphragmatic approach not only provides better access to the lower chest, to the mediastinum and to the upper abdomen, but produces less shock and is ideally suited for the surgical management of conditions such as diaphragmatic hernia, Banti's disease, peptic ulceration of the cardiac end of the stomach and achalasia.

There are many lesions, apart from carcinoma, which affect the œsophagus which should be treated by surgery. The differential diagnosis, and hence the management of these, depends upon accurate investigations, and too often these are neglected because undue reliance is placed upon the radiologist's interpretation of a barium swallow. This may give the correct diagnosis in nine cases out of ten, but the tenth is false and the patient suffers accordingly. The cause of œsophageal obstruction can only be ascertained by œsophagoscopy and biopsy; radiography merely shows the presence and the upper level of the lesion.

*Diverticulum of the pharynx or the œsophagus* causes extreme dysphagia but normal swallowing can be restored by excision of the pouch. Until recently there has been controversy as to whether the operation should be done in one or two stages. Recent reports confirm the advantages of the one-stage procedure. The modern operation is simple and the risk of mediastinitis low; but some pouches, which have been present for a long time, are complicated by carcinoma in the pouch or a stricture in the gullet below. *Fibrous strictures of the œsophagus* can be relieved either by repeated bouginage, as advocated by Grey Turner (1946), or by excision of the affected area and anastomosis. Great advances have been made in the technique and efficiency of both these procedures.

Many varieties of *diaphragmatic hernia* (Harrington, 1938, 1942), both

congenital and acquired, are now recognized. In these some part, or the whole, of the stomach or of the transverse colon and intestine is drawn up into the chest, and the diagnosis is usually confirmed by X-rays using barium meals and enemas, but the kidney (Barrett, 1945), the spleen, the liver or omentum can be the only viscera affected. Other points which have been stressed recently are that small perforations of the diaphragm, such as can be caused by tiny foreign bodies, ultimately lead to large herniæ; that at the extremes of life there is a considerable discrepancy between the size of the œsophagus and the hiatus in the diaphragm so that a telescoping movement is possible without definite herniation (Allison and Johnstone, 1943), and that in obstructed cases much good can be expected pre-operatively by deflating the bowel with a Miller Abbot tube. Diaphragmatic herniæ should nearly always be operated upon from the chest in preference to the abdomen.

*Peptic ulceration of the œsophagus* and *acute œsophagitis* are both relatively common conditions which have been clearly described by Johnstone (1943) and Allison (1946). The ulcers arise as a rule in aberrant islets of gastric mucosa; they are liable to the same complications and require treatment as urgently as do gastric ulcers. Acute œsophagitis is associated with those conditions in which acid pepsin regurgitates abnormally from the stomach into the gullet. The diagnosis may be suspected from the clinical history and the symptoms, but confirmation depends upon œsophagoscopy and, as both lesions can simulate carcinoma, biopsy of the affected area. Both lesions can be alleviated and often cured by a thoracic surgeon. *Spontaneous perforation* of the normal œsophagus has been reviewed recently (Barrett, 1946) and I have operated successfully upon such a patient.

#### THE CHEST WALL

*Tumours of the chest wall* are generally secondary to some malignant growth elsewhere in the body; for such cases no treatment is of permanent avail. But primary tumours occur fairly commonly in the practice of thoracic surgeons and they present three problems: first, diagnosis, and biopsy may be the only way of distinguishing such things as a Ewing's tumour of rib from a typhoid osteitis; secondly, the feasibility of removal; and lastly, the question of how to make good the defect left by excisions involving several adjacent ribs. The primary tumours of the chest wall are not benefited by radiotherapy. *Chondroma* is the most common tumour of rib (pure osteoma is rare, but ossification occurs in most chondromas). It often follows trauma and a reasonably sure connexion has been established between the two events: it grows slowly and may become very large and project into the pleural cavity more extensively than it grows outwards; it is apt to become adherent to the lung and hæmoptysis is a common symptom; there is a high probability that, if left untreated, the chondroma will change to a chondrosarcoma (about one-third of chest wall tumours are malignant when first seen). It follows that the treatment is excision of the tumour together with

the structures into which it has grown, and that no operable case should be treated expectantly.

*Neurofibromas* grow upon the intercostal nerves, the nerve roots, and the nerve sheaths, and *ganglioneuromas* arise in the sympathetic system. The majority are benign and, although they are often very large, can be safely removed; but some which affect children are highly malignant, and some which grow partially in the thorax and partially in the vertebral canal cause serious nerve palsies. *Von Recklinghausen's disease* also involves the intercostal nerves, and large simple or malignant tumours of this type can occur; they may, or may not, be associated with pigmentation of the skin, multiple neurofibromatosis, and vena caval obstruction.

*Cold abscess of the chest wall* can occur as a complication of active clinical tuberculosis in other parts of the body or as a solitary manifestation of pyæmia. The majority arise in a tuberculous adenitis and not in a tuberculous osteitis or periostitis (Barrett, 1939). The affected gland may be intercostal, paravertebral or anterior in location and the pus may spread a long way, in the layer called the endothoracic fascia, before it presents subcutaneously on the front of the chest wall. The abscess is, in fact, of the "collar stud" variety, and little permanent benefit comes from operations which do not eradicate the gland as well as the superficial abscess; in some cases operation may be impossible and in these repeated aspirations should be advised.

#### THE PLEURA

Three advances have modified the treatment of *acute and chronic empyema* in the last few years. First, the widespread use and availability of the *sulphonamide drugs* and of *penicillin*; both substances have proved of great value, but neither has altered the basic principles upon which surgical treatment has developed in the past. There is no doubt that, properly used (Fatti *et al.*, 1947), these substances can often control the toxæmia, sterilize the pus, and shorten the illness, but there is a real danger that, by delaying surgical drainage too long in the hope of achieving spontaneous resolution, acute empyemas may be converted into sterile chronic empyemas, and the harmful effects of the latter are serious.

Secondly, *decortication* has been reinstated as an operation. By the end of the recent war decortication was the standard method of obtaining re-expansion of the lung in those cases of hæmothorax in which atelectasis was a persistent feature (Barrett, 1945). The successes achieved led to decortication being applied to infected hæmothorax, and hence to acute and chronic empyema (Price Thomas and Cleland, 1945). The operation aims at three important benefits: it removes the layer of tissue in which organisms grow, i.e., "the factory"; it allows the lung to expand, to fill the pleural cavity, to become adherent and so to minimize the size of any subsequent infection; it prevents the crippling late deformity of the chest wall, the spine, and the diaphragm which is so characteristic of chronic empyema.

Finally, *breathing and postural exercises* have become such a vital part of

the pre- and post-operative treatment of these and of all surgical thoracic cases that every efficient unit requires the services of specially trained physiotherapists. The exercises improve morale, improve respiratory efficiency, minimize deformity and shorten convalescence.

### CONCLUSION

The conditions which have been mentioned are those in which some recent advance has been made. Such a list gives but a poor idea of the value and the scope of thoracic surgery. Rather should the subject be judged from the fact that scarcely fifteen years ago few patients with chest complaints could be treated surgically, and still fewer benefited from the venture. To-day thoracic surgeons are pressing on to new endeavour and new achievement.

### References

- Abbott, M. (1936): "Atlas of Congenital Heart Disease," New York.  
 Alexander, J. (1944): *Amer. J. Surg.*, **51**, 217.  
 — (1944): *J. Amer. med. Ass.*, **126**, 1139.  
 Allison, P. R., and Johnstone, A. S. (1943): *J. Thorac. Surg.*, **12**, 432.  
 — (1946): *Thorax*, **1**, 239.  
 — (1946): *Proc. roy. Soc. Med.*, **39**, 415.  
 — (1946): *J. Thorac. Surg.*, **15**, 99.  
 Appleton, A. B. (1944): *Lancet*, **ii**, 502.  
 Banyai, A. L. (1946): "Pneumoperitoneum Treatment," London.  
 Barnes, H. L., and Barnes, L. R. (1928): *Amer. Rev. Tuberc.*, **18**, 412.  
 — (1933): *Ibid.*, **28**, 660.  
 Barrett, N. R. (1939): *Tubercle*, **20**, 445.  
 — (1944): *Lancet*, **ii**, 647.  
 —, and Barnard, W. G. (1945): *Brit. J. Surg.*, **32**, 447.  
 — (1945): *Ibid.*, **32**, 421.  
 — (1945): *Lancet*, **i**, 103.  
 — (1946): *Thorax*, **1**, 48.  
 — (1947): *Ibid.*, **2**, 21.  
 Belsey, R. (1946): *Ibid.*, **1**, 39.  
 Blalock, A., et al. (1939): *Ann. Surg.*, **110**, 544.  
 —, et al. (1941): *J. Amer. med. Ass.*, **117**, 1529.  
 — (1944): *J. Thorac. Surg.*, **13**, 316.  
 —, and Taussig, H. B. (1945): *Ibid.*, **128**, 189.  
 — (1946): *Surg. Gynec. Obstet.*, **82**, 113.  
 — (1947): *J. Thorac. Surg.*, **16**, 244.  
 Brock, R. C. (1938): *Brompton Hosp. Rep.*, **7**, 81.  
 — (1942): *Guy's Hosp. Rep.*, **91**, 111.  
 — (1943): *Ibid.*, **92**, 26.  
 — (1943): *Brit. med. J.*, **ii**, 257.  
 — (1946): "The Anatomy of the Bronchial Tree," London.  
 Churchill, E. D., and Sweet, R. H. (1942): *Ann. Surg.*, **115**, 897.  
 Coope, R. (1946): *Thorax*, **1**, 26.  
 Coryllos, P., and Ornstein, G. (1938): *J. Thorac. Surg.*, **8**, 10.  
 Crafoord, C. (1944): *Acta. Chir. scand.*, **91**, 97.  
 —, and Nylin, G. (1945): *J. Thorac. Surg.*, **14**, 347.  
 — (1947): *Thorax* (in the press).  
 Davidson, M. (1941): *Brompton Hosp. Rep.*, **10**, 103.  
 Edwards, A. T. (1946): *Thorax*, **1**, 1.  
 Ellman, P. (1945): *Brit. Heart J.*, **7**, 147.  
 Eloesser, L. (1934): *Amer. Rev. Tuberc.*, **30**, 123.  
 Fatti, L., et al. (1947): *Lancet*, **i**, 257, 295.



- Findlay, C. W., and Sweet, R. H. (1947): *J. Thorac. Surg.*, 16, 81.  
 Foster Carter, A. F. (1941): *Quart. J. Med.*, 34, 139.  
 — (1942): *Brit. J. Tuberc.*, 36, 19.  
 — (1944): *Brit. med. Bull.*, 2, 37.  
 Garlock, J. H. (1944): *Surg. Gynec. Obstet.*, 78, 23.  
 — (1947): *J. Thorac. Surg.*, 16, 215.  
 Graham, E. A., and Singer, J. J. (1933): *J. Amer. med. Ass.*, 101, 137.  
 Gross, R. E., and Hubbard, J. P. (1939): *Ibid.*, 112, 729.  
 — (1944): *Surg. Gynec. Obstet.*, 78, 36.  
 Harrington, S. W. (1938): *J. Thorac. Surg.*, 8, 127.  
 — (1942): *Ann. Surg.*, 115, 705.  
 — (1945): *J. Thorac. Surg.*, 14, 128.  
 Hilton, G. (1945): *Brit. J. Tuberc.*, 39, 51.  
 Holst, J., Semb, C., and Frimann-Dahl, J. (1935): *Acta. Chir. scand.*, 76, 1.  
 Hope Gosse, A. (1947): Personal communication.  
 Hueur, G. J., and Andrus, W. de W. (1940): *Amer. J. Surg.*, 50, 143.  
 Hunter, J. B. (1946): *Proc. roy. Soc. Med.*, 39, 107.  
 Johnstone, A. S. (1943): *Brit. J. Radiol.*, 16, 192.  
 Keers, R. Y., (1946): *Edinb. med. J.*, 53, 643.  
 —, Rigden, B. G., and Steen, P. (1947): *Ibid.*, 54, 30.  
 Keynes, G. (1946): *Brit. J. Surg.*, 33, 201.  
 — (1946): *Proc. roy. Soc. Med.*, 39, 600.  
 Kopelman, H. (1947): *Brit. med. J.*, i, 559.  
 Lee Lander, F. P. (1946): *Thorax*, 1, 198.  
 Lewis, I. (1946): *Brit. J. Surg.*, 34, 19.  
 Maxwell, R. J. C., and Kolnstamm, M. L. (1943): *Brit. J. Tuberc.*, 37, 24.  
 Mead, R. H., Kay, E. B., and Hughes, F. A. (1947): *J. Thorac. Surg.*, 16, 16.  
 Monaldi, V. (1939): *Sett. Med.*, 27, 231.  
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 —, — (1942): *Ibid.*, 12, 98.  
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 —, *et al.* (1946): *J. Thorac. Surg.*, 15, 384.  
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## FOLIC ACID AND PROTEOLYSED LIVER

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*Tropical and non-tropical sprue.*—The introduction of folic acid has revolutionized the treatment of the sprue syndrome as it occurs in adults. Within a week of starting treatment with 10 mgm. folic acid daily by mouth the stool becomes formed, abdominal distension is reduced, and a marked improvement in appetite and sense of well-being occur. The dietetic restriction of fat formerly recommended need not be so strict. Plenty of first-class protein is still advisable. If the anæmia is of the megaloblastic type, a rapid improvement in the blood picture occurs. Many chronic cases of the sprue syndrome, however, have a moderate degree of macrocytic anæmia with a normoblastic marrow. In such cases folic acid may fail to restore the blood picture qualitatively or quantitatively to normal. Oral liver extract or proteolysed liver, 1 oz. (28.4 c.cm.) daily by mouth, should then be tried and in some cases will be successful. Maintenance treatment with folic acid is required in many cases, otherwise a clinical relapse will occur. The dosage needed for this purpose is variable, but is probably around 5 mgm. daily. In coeliac disease the anæmia is usually hypochromic and the bone marrow frankly normoblastic. In our experience folic acid has been ineffective in improving the anæmia or controlling the steatorrhœa. In the occasional case in which the bone marrow is megaloblastic, excellent results have been reported.

*Refractory megaloblastic anæmia.*—The term refractory anæmia was introduced by Bomford and Rhoads (1941) for anæmias of a wide variety of types that were refractory, either temporarily or permanently, to hæmatinic therapy. In 1943 Davidson, Davis and Innes published a series of papers entitled "Studies in Refractory Anæmia", which dealt with the problem of classification on the basis of examination of the bone marrow by sternal puncture and divided the refractory anæmias into two main groups, namely, (1) refractory anæmias with hypocellular normoblastic marrows, and (2) refractory anæmias with hypercellular megaloblastic marrows. Of particular clinical importance was the finding that the prognosis was vastly different in the two groups. Thus, of 16 patients in group 1, 11 died of progressive anæmia within a few months, whilst of 16 cases in group 2 all eventually made a complete recovery. Intensive treatment with large amounts of liver extract, supplemented with iron and vitamins and repeated blood transfusions, was required for long periods if such satisfactory results were to be obtained. The long period of illness during which life was continuously in danger indicated the need for some therapeutic agent which would cause a prompt remission comparable to that obtained in the relapse stage of Addisonian pernicious anæmia from parenteral liver therapy.

This need was met when it was found that the oral administration of a product obtained from the digestion of liver with papain was effective. For descriptive purposes the name "proteolysed liver" was selected and the

mgm. of folic acid daily, all responded. Of five cases given 1 mgm. daily, one responded excellently, two moderately well and two showed no response. We have given folic acid in single doses of 400 mgm. by mouth and 200 mgm. by intramuscular injection. No unpleasant reactions were produced and an excellent hæmopoietic response resulted. Large single doses are, however, wasteful and extravagant, since their effect in raising the blood level continues for only about two or three weeks, and a much larger gain in red cells and hæmoglobin can be obtained if the same amount of material is given in divided doses of 5 to 10 mgm. daily. From experience obtained in Edinburgh it is suggested that the initial dose of folic acid for the treatment of all types of megaloblastic anæmia (Addisonian pernicious anæmia, pernicious anæmia of pregnancy, the megaloblastic anæmia of the sprue syndrome, and idiopathic refractory megaloblastic anæmia) is 10 mgm. daily for ten days, and 5 mgm. daily thereafter until the blood count is normal. For maintenance treatment the requirements have not been finally established; probably they lie in the region of 2½ to 5 mgm. daily. However, for reasons given below, folic acid cannot be recommended for the maintenance treatment of pernicious anæmia.

*Addisonian pernicious anæmia.*—The hæmatological effects of folic acid in Addisonian pernicious anæmia appear to be identical with those resulting from parenteral or oral liver therapy. The question therefore arises whether folic acid should be recommended as the therapeutic agent of choice in pernicious anæmia. The advantage to the patient of replacing parenteral therapy by the ingestion of a small tablet daily is obvious. The disadvantages are the present high price of the material and the risk of the patient failing to take the daily dose regularly, through carelessness or ignorance. It has been established that although folic acid will restore the blood count to normal and maintain it there, it will neither prevent nor cure subacute combined degeneration of the cord. Hence, it is imperative to stress that for the maintenance treatment of pernicious anæmia reliance must still be placed on liver therapy, and particularly on parenteral liver therapy. This is especially the case if any signs of damage to the central nervous system are present. Folic acid can be recommended as a temporary measure for cases of pernicious anæmia which have become sensitized to parenteral liver extracts, since we have found that no such reactions occur when folic acid is given, either parenterally or orally. Desensitization must ultimately be carried out if parenteral liver therapy is to be continued (see page 317). If this is deemed undesirable the combination of folic acid and oral liver therapy can be recommended. Folic acid therapy can be used as a temporary measure for patients who are going on holiday or on business to places where it may be difficult to receive their routine injections of liver extract. The conclusion we have reached at the time of writing is that the injection of parenteral liver extract still remains the best method of treatment for pernicious anæmia at all stages of the disease, and that folic acid should be

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steady rate of decay, and this is claimed to be one of its chief advantages, since if given in proper dosage it is held to have no long-range harmful effects on the body.

Radio-active phosphorus has been used in America for the treatment of *leukæmia* and *polycythæmia vera*. The quantity of radio-active material and frequency of injections are adjusted according to the individual's response to treatment. The danger of causing aplastic anæmia from overdosage must never be forgotten. The results reported in leukæmia appeared to be similar to but little, if any, better than those expected from deep X-ray therapy. In polycythæmia, partial or complete remissions are claimed in a high proportion of cases. Experienced hæmatologists in America believe that radio-active phosphorus given in carefully controlled doses is the best method of treatment for polycythæmia so far used. The results reported by Lawrence (1947), of Berkeley, California, in 90 cases treated by this method during the past seven years, are most impressive. Other advantages claimed are that treatment can be undertaken in localities where no deep X-ray plant is available, and can be carried out by the physician in charge of the case who, in view of his clinical experience, may be the best person to assess dosage. At the time of writing, radio-active phosphorus is not available in Great Britain for therapeutic purposes.

#### URETHANE

Urethane (ethylcarbamate) was found to have a growth-inhibiting effect on animal tumours, and this suggested its trial in the leukæmias. In 1946, Paterson, Haddow, Thomas and Watkinson reported on the effects produced in 19 cases of myeloid and 13 cases of lymphatic leukæmia. Remarkable palliative results were recorded, in many cases comparable to those obtained by irradiation, both in degree and in their certainty of relapse. The drug was dispensed as a mixture containing 1 gm. to a tablespoonful of chloroform water sweetened with syrup of orange. The dosage used varied considerably, but was usually around 3 to 5 gm. daily. The time taken to reduce the white cell count to approximately 20,000 varied from eleven to thirty days. Reduction in the size of the spleen and lymph nodes resulted, with improvement in the patient's general health. Nausea was a common toxic effect, and when accompanied by vomiting necessitated a discontinuation of oral treatment. Rectal administration was sometimes successfully employed in such cases.

Treatment was most effective in chronic myeloid leukæmia, less effective in lymphatic leukæmia, and least effective in all forms of acute leukæmia. This has also been my experience, and, on the whole, I have not been favourably impressed by the results achieved, because of the incidence of toxic symptoms, the failure to obtain regularly satisfactory clinical results, except in the earlier stages of chronic myelogenous leukæmia, and because of the onset of relapse which may rapidly occur when the drug is withdrawn.

material is marketed under the trade name "hepamino". A report on the method of preparation and its clinical trials was published in 1943 (Davis, Davidson, Riding and Shaw). During the next three years reports were published on its dramatic effects in the treatment of refractory megaloblastic anaemia associated with pregnancy, the puerperium and the sprue syndrome, and in cases for which no cause could be discovered (Davis and Davidson, 1944; Davidson and Davis, 1947). To this latter group the name "idiopathic refractory megaloblastic anaemia" was applied. During the past five years I have investigated 59 cases of refractory megaloblastic anaemia, of which 25 cases belonged to the idiopathic group. During the past eighteen months folic acid has been found to be equally effective as proteolysed liver in all types of refractory megaloblastic anaemia. Since it is simpler, cheaper and more pleasant to take one 5 mgm. tablet of folic acid than 1 oz. of proteolysed liver, folic acid must be considered the therapeutic agent of choice in all types of refractory megaloblastic anaemia (Davidson and Girdwood, 1946, 1947a, b). In the occasional case, usually associated with the sprue syndrome, in which folic acid is unable to restore the blood picture qualitatively and quantitatively to normal, proteolysed liver should be tried, since it may succeed when parenteral liver extract and folic acid have failed.

Since subacute combined degeneration of the cord rarely if ever occurs in pernicious anaemia of pregnancy, the sprue syndrome or in idiopathic refractory megaloblastic anaemia, folic acid can be safely used for maintenance treatment in these conditions.

#### THYMINE (5-METHYLURACIL)

Thymine was isolated and synthesized many years ago. Stokstad showed it to be capable of replacing folic acid as a growth factor for lactic acid bacilli. Bacteria thus grown require about 5000 times as much thymine as folic acid. Spies *et al.* (1946) obtained a significant erythropoietic response in two cases of pernicious anaemia given 10.2 and 4.5 gm. daily by mouth. I have confirmed this result. In addition, Spies reported prompt haematological and clinical improvement in four cases of tropical sprue given 15 gm. daily by mouth. If, as appears to be the case, thymine is no more effective than folic acid, the fact that the dosage required is more than 1000 times greater suggests that this substance is more of academic than of therapeutic importance. Thymine is not at present available for routine therapeutic purposes in Great Britain.

Now

where

#### RADIO-ACTIVE PHOSPHORUS

The radioactive phosphorus is prepared by bombarding phosphorus in the form of phosphoric acid. It is given therapeutically by the intravenous route as a solution of sodium phosphate. Its radio-active properties have a

## ANTIHISTAMINE DRUGS (ANTHISAN, BENADRYL)

A proportion of patients undergoing treatment with liver extracts given parenterally become sensitized and in consequence each injection is followed by a reaction which may be so mild as to be more unpleasant than serious, or may be so severe as to endanger life. In such cases a decision must be taken either to replace parenteral therapy with oral therapy (liver, liver extract, proteolysed liver, folic acid, or hog's stomach) or to desensitize the patient. The technique employed and the results achieved in some 40 cases of pernicious anæmia were described by McSorley and Davidson (1944). In cases markedly sensitive the procedure is potentially dangerous and must be undertaken only by workers experienced in this field. Recent work by Hunter and Hill (1947), carried out in the Departments of Therapeutics and Medicine in the University of Edinburgh, has shown that these dangers may be obviated or greatly reduced by preceding administration of antihistamine drugs. The drug used was "anthisan". In mild cases a single dose of 300 mgm. of anthisan, given one to two hours before carrying out the technique of desensitization as described by McSorley and Davidson, was found to be effective in controlling the development of reactions. In more severe cases the antihistamine drug had to be given in divided doses for periods of hours or days prior to the start of desensitization. Full details of this interesting and important work will be appearing shortly.

## IRON THERAPY

*Radio-active iron.*—The introduction of radio-active iron has opened up a new field of research into the absorption, storage, utilization and excretion of iron. The life and fate of the erythrocyte have been accurately investigated. Valuable information in regard to causes of refractoriness to iron therapy can be confidently expected.

*Molybdenized iron.*—Recent reports from America (Neary, 1946) claim that the fortification of iron with traces of molybdenum produces an increased rate of hæmoglobin formation and a response to treatment in cases of iron deficiency anæmia partially or completely refractory to pharmacopœial preparations of iron. Molybdenized iron is not yet on sale in Great Britain.

## DRUGS AND PREPARATIONS USED FOR THE CONTROL OF BLEEDING

Hæmostatic agents are required when bleeding cannot be controlled by mechanical means, including pressure. The bleeding tendency may be due to some defect in the intrinsic clotting mechanism, to a deficiency of platelets or to some abnormality of the capillary wall. General measures, including the transfusion of blood, are indicated in all such conditions if the local measures described on page 318 are unsuccessful.

Sufficient time, however, has not elapsed to decide finally whether urethane is superior to X-rays in prolonging life and in maintaining the patient in a better state of health. All that can be said at present is that a new drug has been introduced which has effects comparable to X-rays, and that it is probably more effective and less toxic than arsenic.

#### PENICILLIN, PYRIDOXINE AND FOLIC ACID IN THE TREATMENT OF AGRANULOCYTOSIS

In every case of agranulocytic angina exhaustive inquiries should be made regarding drugs taken by the patient, and any preparations with leucotoxic properties should, of course, be at once withdrawn. In a proportion of cases recovery then occurs rapidly without further specific treatment. Since the cause of death in agranulocytosis is directly attributable to bacterial invasion of the tissues and blood stream, the single most important therapeutic measure is the prevention and cure of infection. Until recently the sulphonamide drugs were used for this purpose, although they had the serious disadvantage of having leucotoxic properties. The position, however, has now been entirely altered by the introduction of *penicillin*, which fortunately has no depressing effects on the production of immunity or on hæmatopoiesis. Every case of agranulocytosis, whether idiopathic or symptomatic, should receive immediately local and general treatment with penicillin. I can testify from personal experience to the remarkable results which may be expected. When the cause of the agranulocytosis is known and has been removed, no treatment may be required other than the administration of penicillin.

In other cases in which the cause is unknown, or when, despite penicillin therapy, the agranulocytosis persists, attempts must be made to stimulate the production of granulocytes. Leucocyte extracts, parenteral liver therapy, and the application of X-rays have been used for this purpose and all have proved disappointing. The parenteral administration of the sodium salts of pentose nucleotide (pentnucleotide) has been the standard method of treatment used for the past ten years. Although many favourable results have been published regarding the value of pentnucleotide, recent investigations suggest that the original claims were over-optimistic. Good results have recently been claimed from the administration of *pyridoxine*, a member of the vitamin B complex, in doses of 150 to 200 mgm. daily by mouth or by intravenous injection. This line of treatment is certainly worthy of further investigation. The investigator must, however, always be on his guard against attributing any resultant increase of leucocytes to the test preparation if coincidentally the cause of the agranulocytosis has been removed and the dangers of septicæmia controlled by penicillin therapy.

*Folic acid* has also been claimed to be of value in the treatment of agranulocytosis, but I have found it to be valueless for this purpose.

In such cases reliance must be placed on the removal of the cause of the condition, if possible, on blood transfusion, and on splenectomy in the case of idiopathic thrombocytopenic purpura.

*Drugs acting on the capillaries—Rutin.*—In 1936, Szent-Gyorgyi showed that a substance prepared from lemons and paprika, called "citrin", would restore to normal an increased capillary fragility produced experimentally in guinea-pigs. The substance was named vitamin P (the antipermeability vitamin) and was shown to be closely connected with the flavone, hesperidin. Recent work suggests that the active agent in citrin is a derivative of flavone to which the name "rutin" has been given. It is obtained from the leaves and flowers of buck-wheat. It is given by mouth in tablets containing 20 mgm., and the dosage is stated to be from 20 to 40 mgm., thrice daily. Remarkable results have been claimed for the drug in hereditary hæmorrhagic telangiectasis, in which the bleeding tendency is said to be controlled within twenty-four hours of the start of treatment. Other workers have shown that the increased capillary fragility which occurs in a proportion of cases of hypertension may be restored to normal. Treatment must be continued for two or three months to achieve this result. If independent confirmation is forthcoming this work is of great clinical importance, since it has been shown that the incidence of vascular accidents including apoplexy is very much higher in hypertensive patients with abnormal capillaries than in those with normal capillary fragility. Further time must elapse before the therapeutic value of rutin in the control of other hæmorrhagic conditions can be properly assessed. Rutin is now available in Great Britain.

### References

- Angier, R. B., *et al.* (1945): *Science*, **102**, 227.  
 Bomford, R. R., and Rhoads, C. P. (1941): *Quart. J. Med.*, **10**, 175.  
 Cohn, E. J., *et al.* (1944): *J. clin. Invest.*, **23**, 417.  
 Davidson, L. S. P., Davis, L. J., and Innes, J. (1943): *Edinb. med. J.*, **50**, 226, 355, 431.  
 —, — (1947): "Advances in Internal Medicine", New York, vol. 2, p. 481.  
 —, and Girdwood, R. H. (1946): *Lancet*, **ii**, 373.  
 —, — (1947a): *Brit. med. J.*, **i**, 587.  
 —, —, and Innes, E. M. (1947b): *Lancet*, **i**, 511.  
 Davis, L. J., and Davidson, L. S. P. (1944): *Quart. J. Med.*, **13**, 53.  
 —, —, Riding, D., and Shaw, G. E. (1943): *Brit. med. J.*, **i**, 655.  
 Henderson, J. L. (1947): *The Practitioner*, **150**, 201.  
 Hunter, R. B., and Hill, A. G. S. (1947): *Lancet*, **ii**, 383.  
 Lawrence, John (1947): *Brit. med. J.*, **ii**, 139.  
 McSorley, J. G., and Davidson, L. S. P. (1944): *Ibid.*, **i**, 714.  
 Neary, E. R. (1946): *Amer. J. med. Sci.*, **212**, 76.  
 Paterson, E., Haddow, A., Thomas, I. A., and Watkinson, J. M. (1946): *Lancet*, **i**, 677.  
 Spies, T. D., *et al.* (1946): *J. Amer. med. Ass.*, **130**, 474.

*Absorbable hæmostatics.*—In the past, reliance has been placed on the local application of various styptics, such as acids, iron salts and alum. Their use has been largely abandoned for, although they may stop bleeding temporarily, the local tissue injury which they cause often results in aggravated bleeding later. More recently the value of plasma and certain tissue extracts applied to the bleeding area has been recognized. The introduction of Russell's viper venom, a rich source of thrombokinase, and the production of a pseudo-globulin fraction obtained from plasma for local application, were definite therapeutic advances. Intensive research during the late war produced a new series of hæmostatics which could be applied locally and which are spontaneously absorbed in a period of days or weeks. These preparations can be divided into two main groups, namely, (1) those derived from plasma, and (2) those from other sources. The former group consists of such preparations as fibrinogen, fibrin or thrombin which are applied to the bleeding surface singly or in combination. The second group includes oxidized cellulose, gelatin sponge, and calcium alginate derived from seaweed. The hæmostatic effects of all these preparations is probably related to the great surface which they offer to extravasated blood. The plasma preparations have in addition a direct effect on blood coagulation. These new hæmostatic agents have been widely and successfully used by surgeons, and particularly neurosurgeons, in America. Their value in medical diseases characterized by a bleeding tendency such as thrombocytopenic purpura and hæmophilia awaits further investigation.

*Hæmostatic agents given parenterally.*—Several commercial hæmostatic preparations are widely advertised as being effective in the control of hæmorrhage when given by the subcutaneous and intramuscular routes in relatively small amounts. Grave doubt exists of the value of such preparations. Until recently the transfusion of whole blood or plasma was the only method of obtaining satisfactory results by the parenteral route. An impressive step forward has been made by Cohn and his co-workers (1944), who have produced by fractionation of plasma a globulin fraction which, when injected intravenously in a dose of 200 to 600 mgm., produces immediate reduction of the coagulation time in hæmophilia to normal and frequently maintains it there for many hours. It is expected that even more potent fractions of plasma will be obtained by this method. The method is already in use in America (Henderson, 1947), and British physicians are eagerly awaiting a supply of this material.

*Drugs acting on the formation of platelets.*—When thrombocytopenia results from direct or conditioned dietary deficiency an increase of platelets will result from the correction of the deficiency, i.e. folic acid, liver or liver extract, in pernicious anæmia and other megaloblastic anæmias. When thrombocytopenia arises idiopathically, as in essential thrombocytopenic purpura or secondary to toxic, allergic or infective states, no drug is known which has a specific stimulating effect on the production of thrombocytes.

stomach, and it would seem that it is precisely this secretion unbuffered by food that is potentially dangerous. But since not all stomachs digest themselves, there must clearly be some natural protective immunity of the stomach mucosa.

In the past many studies of the digestion of living tissues have been made, and recently Price and Lee (1946) have repeated and extended these observations. They showed that the stomach of dogs could digest autogenous tissues such as omentum, intestine, liver, pancreas, spleen, when implanted into the lumen of the stomach. Most of these tissues showed rapid digestion in these circumstances. The sero-muscular coat of the stomach itself was not exempt; only the gastric mucosa was immune to ordinary digestion under the conditions of the experiment. They also showed that when imbedded tissues became covered with proliferating gastric mucosa, they were immune to further digestive action. The real nature of this immunity remains unknown, but there is no doubt that the secretion of mucus provides one line of defence, and that once this has been penetrated, erosion may follow.

The problem of the etiology of ulcer may therefore be thought of in terms of two opposing forces, that of acid-pepsin digestion on the one hand, and that of a mucosa more or less resistant to injury on the other. It is the outcome of this battle that decides in the first place whether an acute ulcer will form, and whether in the second place it will become chronic. If we accept this as a broad statement, the problem of therapy becomes more rational: it is to seek out methods of controlling excessive, particularly high fasting, secretion, and to increase the resistance of the mucosa to digestion. In recent years progress has been made along both these paths.

How can gastric secretion be controlled? We believe that gastric juice is mainly secreted in response to nervous influences mediated by the vagus and a hormone, gastrin, produced in the stomach itself from the action of food. Although much work is being done on gastrin, its place in the clinical picture of ulcer is not yet defined. Current interest has focused more on the nervous phase of gastric secretion.

*The neurogenic theory* of peptic ulceration is not of course a new conception and it has received periodic attention for a very long time. Brodie, in 1814, was the first to demonstrate the effect on secretion of section of the vagus of a dog. Rokitsky, more than a hundred years ago, made the following comment: "Perhaps the proximate cause may be looked for in diseased innervation of the stomach, owing to a morbid condition of the vagus and to extreme acidification of the gastric juice". The neurogenic theory then fell into abeyance until increasing knowledge of the autonomic nervous system suggested the concepts of vagotonia and sympathicotonia to Eppinger and Hess in the early years of this century. Following this, von Bergmann, before the first world war, elaborated a theory of ulcer in terms of autonomic imbalance, a theory which has again become so popular. Later, Cushing (1932) emphasized the part that might be played in causing peptic ulcer by derangement of autonomic centres in the hypothalamus, centres which utilize the vagal pathway leading to increased secretion and



# ADVANCES IN GASTRO-ENTEROLOGY

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IN this article it is proposed to single out for review only the ulcer problem, and to consider those aspects of its etiology which have become clarified in recent years and the lines of treatment which logically result.

## PATHOGENESIS

No rational treatment of ulcer is possible so long as its etiology eludes us, but it seems likely that there are multiple causative factors and the agents responsible for duodenal ulcer in Western man are not necessarily those responsible for the widespread ulceration in the peasants of Southern India. Ulcers, and in particular acute ulcer, can be produced in a number of ways experimentally but their relation to naturally occurring ulcer in man is dubious. A study of this mass of experimentation produces despair at any attempt to create a synthesis. There are, however, certain constantly recurring factors which it is impossible to dismiss, first and foremost being the digestive properties of gastric juice. Ulcers occur only in those sites to which acid and pepsin have free access, i.e., the œsophagus, the stomach, the duodenum, the intestine after an anastomosis with the stomach, and the intestine at the junction of Meckel's diverticulum. Ulcers may be formed experimentally in rats, cats, and dogs, under a number of experimental conditions in which there is a flow of unneutralized gastric juice on the mucosa when digestion of it occurs. Most important of all, artificial ulceration in man has been produced by similar means.

Wolf and Wolff (1943), in their subject Tom with a gastrostomy, subjected an erosion on the periphery of the collar of exposed mucosa to the digestive action of gastric juice continuously for four days. At the end of that time it showed the typical appearances of a punched-out chronic peptic ulcer; it measured 4 mm. in diameter and was growing rapidly. The experiment was then discontinued and the ulcer and surrounding area were covered with a protective dressing, and rapid healing occurred in three days.

It is abundantly clear from this classical experiment that the human stomach under certain conditions is quite capable of digesting itself to produce an ulcer. How then, may it be asked, does the secretion of the ulcer patient differ from the non-ulcer patient? The response of the stomach of the ulcer patient to a test meal differs but little from that of a normal; there is in fact no degree of acidity or volume of secretion obtainable in ulcer stomachs which cannot be paralleled in non-ulcer stomachs. It is for this reason that the superstitious ritual of a test meal examination yields so little of diagnostic value. The function in which the ulcer stomach may behave entirely differently from the normal, however, is in its fasting secretion. As Dragstedt (1947) has shown, this may be many times that of a normal

stomach, and it would seem that it is precisely this secretion unbuffered by food that is potentially dangerous. But since not all stomachs digest themselves, there must clearly be some natural protective immunity of the stomach mucosa.

In the past many studies of the digestion of living tissues have been made, and recently Price and Lee (1946) have repeated and extended these observations. They showed that the stomach of dogs could digest autogenous tissues such as omentum, intestine, liver, pancreas, spleen, when implanted into the lumen of the stomach. Most of these tissues showed rapid digestion in these circumstances. The sero-muscular coat of the stomach itself was not exempt; only the gastric mucosa was immune to ordinary digestion under the conditions of the experiment. They also showed that when imbedded tissues became covered with proliferating gastric mucosa, they were immune to further digestive action. The real nature of this immunity remains unknown, but there is no doubt that the secretion of mucus provides one line of defence, and that once this has been penetrated, erosion may follow.

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motility of the stomach. The production of ulcer from cerebral injury or disease, although quite authentic, is uncommon. What may be much more common is derangement of the hypothalamic autonomic centre from psychic causes, and modern interest has been directed to the relationship that obtains between these activities and gastric function. To this relationship the term "psychosomatic" is applied, and although this word threatens to become an unthinking catchword, when it will follow "focal infection" into the limbo of debased currency, it does at least denote a fresh interest in the body-mind controversy.

In the sense that the emotions can play havoc with the visceral functions of the body the concept is not new. Such an interaction was recognized in one of the Chester Beatty papyri of the 12th century B.C. Nor even to-day would it be easy to better the advice of Lord Bacon: "As for the passions and studies of the mind; avoid envy; anxious fears; anger fretting inwards; subtle and knotty inquisitions; sadness not communicated". What is new, with an increasing knowledge of the autonomic nervous system, is the *correlation of changes of gastric function with the emotional state of the patient*, as in the work of Wolf and Wolff.

Since the days of Beaumont's classical observations on Alexis St. Martin, various patients with fistulous openings of the stomach have been studied. In none, however, have the relations between emotions and functions of the stomach been studied so systematically as in Tom the subject of Wolf and Wolff's researches. Records of motility, secretion, and vascularity of the stomach were made and correlated with emotional situations occurring spontaneously. Profound alterations in function were found to accompany these disturbances, and in general, output of acid, motor activity and vascularity were associated together and were depressed in emotional situations met with by flight or withdrawal, whilst all these functions were accelerated when the response of the patient to a situation was aggressive and full of fight. Prolonged disturbances of this kind with reddening and engorgement of the mucous membrane produced many of the changes often described as "gastritis", and it is not difficult to see how such an excessive autonomic response might give rise to symptoms which could be truly described as functional.

The word "functional" is too often thought of by both doctor and patient as equivalent to "imaginary", although a spasm of the gut is just as painful whether produced by some autonomic discharge or by some local irritant within the lumen. The patient often has difficulty in grasping this and a simple analogy suggested by Jones (1947) may be useful. The appearances in an eye which is red, swollen and weeping may either be due to emotion, or may be caused by a chemical irritant. Examination of the eye does not distinguish between these two possibilities, since in each case the changes are produced by the same vascular reactions. Precisely the same process can take place in the gut. It is not only the eye that weeps or the cheek that blushes, the gastric mucosa does both. What is abnormal in the ulcer type of stomach is the occurrence of an automatic response such as hypermotility, secretion and increased vascularity when this reaction is not called for by the situation. It is as if the stomach were getting ready to receive food which does not in fact

appear. The explanation of the psycho-analytical school suggests that the reception of food by the stomach is associated with feelings of security, and that the patient, faced with a task of external adjustment, retreats into an attitude appropriate to a state of relaxation. Whether this explanation is a useful one only time will show, but physiologically speaking, the reactions of the organism inappropriate to the situation reveal a lack of integrated response from what we regard as normal.

#### TREATMENT

*Drugs.*—The work of Wolf and Wolff simply shows the way in which emotional situations can affect the function of the stomach, it does not prove that such situations, if sustained, can produce permanent change in the stomach. But it does provide justification for treating ulcer patients by trying to eliminate the stressful situations in their lives or by altering their reactions to these situations. When this is not possible, *phenobarbitone* remains a most useful drug to depress at the highest level this unwanted autonomic discharge.

The vagus is the main efferent nerve of the secretory reflex and cutting of the vagus experimentally has long been shown to abolish appetite juice and the secretion produced by sham feeding. It is probably also the main pathway by which emotional tension can affect gastric function, and paralysis of the vagus might therefore be expected to cut down the high fasting secretion of the ulcer stomach. It is here that *vagal paralysants* of the belladonna group find their place. Their use is old and Douthwaite (1947) has re-emphasized the importance of pushing their dosage to the point of toxicity, the only point at which they affect gastric activity effectively. The theoretical objection to their use is that they paralyse not only the acid secretion but also the alkaline mucous secretion from the pyloric antrum, and although the total output of acid is diminished its concentration is no less. Hypermotility is much lessened.

*Vagotomy.*—The next logical step is to cut the vagus. All the earlier attempts to do this in man were incomplete and no permanent lowering of acidity resulted. Since the anatomy of the vagus nerves has been more closely studied, a much more complete section has been made by surgeons using a transpleural approach. Dragstedt has now done a large series with considerable success but it also seems possible to do a complete denervation by a subdiaphragmatic approach (Orr and Johnson, 1947). Following the operation there is immediate loss of ulcer pain and this is possibly due to the resulting decreased motility of the stomach. Healing of the ulcer with clinical recovery occurs in the great majority of the reported cases. Nor has recurrent ulceration been reported, although some of Dragstedt's cases have been followed for four years. Hypomotility of the stomach may present difficulties and this may lead to gastric retention needing a gastro-enterostomy to relieve it. In general, the total volume of fasting gastric secretion

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effect could not be accounted for by the secretory inhibitory properties of the extract. It was also found that this effect persisted for long after the injections were withdrawn and that some kind of immunity to ulceration was produced. These findings seem highly significant since in control dogs with this type of operation, death from hæmorrhage or perforation of the ulcer occurs in 98 per cent. in a few months. It has therefore been postulated that the intestinal extract containing these inhibitory properties has in addition an anti-ulcer factor.

A different approach to the problem dates from the clinical observation that pregnancy has a very beneficial effect on the course of an ulcer. Extracts of the urine of pregnant women were found to exert a healing action on experimental ulcers in the Mann-Williamson dog, and this work was extended to the use of urine of normal men. This factor, named "urogastrone", is not the anterior-pituitary-like hormone, and it appeared to produce its beneficial effect on the ulceration of these dogs by promoting healing and not by inhibition of gastric secretion. The urine has been also shown to contain a gastric secretory depressant factor.

The experimental results to date therefore show that potent extracts can be made from the intestinal mucosa and from the urine, which have inhibitory properties on the secretion and motility of the stomach and which also have a most beneficial effect on the course of certain experimental ulceration in animals. None of these extracts has as yet been obtained pure.

These extracts have been given to patients with duodenal ulcer (Greengard *et al.*, 1946) and the preliminary results are encouraging, but observation will have to be extended over a much longer period before their effectiveness can be definitely established. The variable clinical course of peptic ulcer makes assessment of any ulcer therapy very difficult. The experimental results are extremely promising but work in the further purification of these anti-ulcer extracts is rendered slow owing to the absence of any rapid method of assay. They do, however, offer hope that in time an effective hormonal treatment of ulcer may be possible.

### References

- Cushing, H. (1932): *Surg. Obstet.*, 55, 1.  
 Douthwaite, A. H. (1947): *Brit. med. J.*, ii, 43.  
 Dragstedt, L. R. (1947): *Canad. med. Ass. J.*, 56, 133.  
 Greengard, H., *et al.* (1946): *Gastroenterology*, 6, 625.  
 Jones, C. M. (1947): *Ibid.*, 8, 281.  
 Moore, F. D., *et al.* (1947): *J. Amer. med. Ass.*, 133, 741.  
 Orr, I. M., and Johnson, H. D. (1947): *Lancet*, ii, 84.  
 Price, P. B., and Lee, T. F. (1946): *Surg. Gynec. Obstet.*, 83, 61.  
 Sandweiss, D. J. (1945): *Gastroenterology*, 5, 404.  
 Wolf, S., and Andrus, W. D. (1947): *Ibid.*, 8, 429.  
 —, and Wolff, H. G. (1943): "Human Gastric Function," London.

is much reduced following vagotomy although some writers have reported a tendency to return to the original level. The objections to this operation are not yet known, and the long-term effects of cutting a most important nerve to the gut and viscera may show themselves in this. Removal of vagal action may allow the sympathetic full rein, and Moore (1947) reports a case with hypertension in which death followed a cerebrovascular accident nine months after operation. The reverse disorder may also occur, as he notes three patients who bled from duodenal ulcers following splachnicectomy, possibly from unopposed vagal action. Without decrying the possibilities of what is the most physiological operation for ulcer yet devised, these objections must be borne in mind. Wilfully upsetting the autonomic balance in the abdomen may not be without its ultimate dangers.

After vagotomy we might, however, expect that stress situations could no longer exert their effect on gastric function, and Wolf and Andrus (1947) report a pertinent case in which the gastric mucosa could be inspected before and after vagotomy.

Before the operation, the activity of the stomach reflected the mood of the patient and showed changes similar to those noted in the subject Tom, but after vagotomy, when the emotional state of the patient was aroused, no corresponding change appeared in the gastric mucosa. The observations were consistent with the view that gastric function had become insulated from the emotional state of the body.

*Hormone therapy.*—An entirely new and most hopeful approach to the treatment of ulcer has arisen in the last fifteen years from the study of the gastro-intestinal hormones, which opens up the possibility of controlling the activity of the stomach by hormonal action and attacking ulcer directly by the use of anti-ulcer extracts (Sandweiss, 1945). "Secretin", the effective hormone for the secretion of pancreatic juice, was discovered by Bayliss and Starling in 1902. This first showed the possibility of controlling the activity of the gut, not by any nervous mechanism but through a local hormonal influence. Secretin has now been isolated in crystalline form. There are now a series of extracts from the gut which can affect the function of the stomach, gall-bladder, pancreas, and small intestine, and it seems probable that these play an important part in the economy of the body.

Their interest for gastric physiology dates from the observation that fat introduced into the intestine inhibits secretion and motility of the stomach and that this inhibition occurred in auto-transplanted stomachs, thus proving conclusively that some humoral agent existed. The extract obtained from the intestinal mucosa which has this inhibitory action has been named "enterogastrone", and it has been shown to be effective in animals and in man. The present evidence suggests that this substance contains separate inhibitory agents for secretion and motility. When, however, enterogastrone was administered to dogs with the Mann-Williamson operation, a type of gastro-jejunosomy, it was found that this extract had considerable effect in preventing the jejunal ulceration which always occurred and that this

the tissues and organs of the host. Indeed, pharmacological activity, that is to say, toxicity, in chemotherapeutic drugs is an undesirable property, which seriously detracts from the usefulness of most of these substances. In this respect penicillin is the only agent that has anywhere approached the standard required of the ideal chemotherapeutic substance, which must have not only a selective action on the infecting organism but also no toxic action on the host.

Concerning the mode of action of chemotherapeutic drugs in the body it may be mentioned here that they seldom kill the infecting bacteria and it is far from necessary that they should do so, but the concentration of drug in the tissues should be sufficient to interfere with the metabolism and multiplication of the bacteria so that they can be more readily killed by the natural defences of the body. The function of chemotherapeutic drugs in the treatment of an infection is thus confined to depressing the activities of the infecting organisms, whilst resolution of the infection and recovery are dependent upon the natural recuperative powers of the host.

#### BACTERIOSTATIC TESTS

In the assessment of the chemotherapeutic potency of drugs the basic laboratory test is that in which an estimation is made of the bacteriostatic concentration, that is to say, the lowest concentration of the substance that will inhibit the growth of bacteria in a suitable culture medium. The results of a number of such tests performed in the Bland-Sutton Institute of Pathology, Middlesex Hospital, on sulphathiazole, penicillin and streptomycin with various bacteria are shown in table I, where the bacteriostatic concentrations are expressed in mgm. per 100 c.cm. so that the antibacterial activities of the three drugs can be compared weight for weight.

TABLE I

	Bacteriostatic concentration in mgm. per 100 c.cm. of:—		
	Sulphathiazole	Penicillin	Streptomycin
<i>Staphylococcus pyogenes</i> ..	2	0.002	0.2
<i>Streptococcus pyogenes</i> ..	1	0.0005	0.05
<i>Bacterium coli</i> .. ..	5	2	3
<i>Proteus</i> .. ..	40	3	3
<i>Pseudomonas pyocyanea</i> ..	40	50	5

In the first place it is evident that the findings recorded here correspond with our general clinical experience with the sulphonamides and penicillin. Thus sulphathiazole is effective against infections caused by bacteria which are inhibited in their growth by sulphathiazole in concentrations up to 5 to 10 mgm. per 100 c.cm., the level that should be reached in the blood stream when the drug is properly administered, whereas this drug is of little or no value against infections with *Proteus* and *Ps. pyocyanea*, which are inhibited only by concentrations of sulphathiazole beyond the therapeutic range.



# ADVANCES IN CHEMOTHERAPY

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DURING the past year the most notable advance in chemotherapy has been the introduction of streptomycin for the treatment of tuberculosis and certain other infections. This new drug is produced in culture media by the soil mould *Streptomyces griseus* in much the same way as penicillin is produced by *Penicillium notatum*, but differs from penicillin in being active against tubercle bacilli and certain gram-negative bacilli that are relatively resistant to penicillin. Streptomycin therefore promises to be a welcome addition to the sulphonamides and penicillin, a therapeutic armamentarium which, in a single decade, has totally altered our conceptions of the prognosis and treatment of bacterial infections. Streptomycin is as yet available only in small quantities for research purposes and its value as a therapeutic agent is still *sub judice*, so that it would be inappropriate to review its clinical use at this stage. It would, however, appear that the use of streptomycin will be largely confined to the treatment of tuberculous conditions and that, in view of its undoubted toxicity, streptomycin should be employed in other infections only when bacteriological investigations indicate that the infecting organisms are resistant to sulphonamides and penicillin and are sensitive to streptomycin. On the other hand, the value of the sulphonamides and penicillin in the treatment of infections is now fully recognized and they are so highly valued that there is a tendency, especially with penicillin, to prescribe these remedies without due attention to their limitations. It is therefore proposed here to recapitulate some of the fundamental principles of chemotherapy and to show how an appreciation of these principles may help in the proper application of chemotherapy in the treatment of bacterial infections.

## THE FUNCTION OF CHEMOTHERAPEUTIC DRUGS

Chemotherapy may be defined as the treatment of infections in man or animals by chemical substances which act against the infecting organisms. The intelligent use of chemotherapy in bacterial infections is thus ultimately dependent upon the bacteriologist who isolates the infecting organism and tests its sensitivity to chemotherapeutic drugs. These investigations are of course by no means always necessary in a particular case so long as the nature of the infecting organism and the drug required for treatment can be inferred with a reasonable degree of certainty, as in acute tonsillitis, which is usually caused by streptococci and is amenable to treatment with sulphanilamide. It is, however, important to realize that chemotherapeutic drugs are of value only as antimicrobial agents and that they should not be used empirically or for symptomatic treatment, as is the practice with other types of drugs which owe their value to their pharmacological activities in

of staphylococci that had been previously exposed to penicillin. Knowledge of the other type of drug resistance, that is to say, acquired resistance, is almost wholly derived from experimental work. The method used to induce bacteria to tolerate abnormally high concentrations of drug has been to expose the bacteria to increasing concentrations of the drug in successive subcultures or to pass the bacteria through successive batches of animals which are treated with increasing doses of the drug. Regarding the nature of the change that occurs when bacteria acquire drug-resistance there are two main schools of thought, one holding the view that it is a progressive selection of chance variants with increased resistance to the drug or a "survival of the fittest", and the other school considering that the drug acts directly on the bacteria, so modifying them that they become resistant and transmit this acquired character to their descendants. From evidence brought forward by McIntosh and Selbie (1943) and other authors whose work is fully reviewed by Selbie (1946), the process involved would appear to be one of natural selection.

Of more immediate practical importance than the way in which bacteria acquire resistance is the question of the origin of abnormally resistant bacteria in clinical infections. Here again, there is a divergence of opinion, some holding that most of these are naturally resistant, whereas others are of the opinion that quite a large proportion have acquired resistance by previous exposure to chemotherapy, either in the infected patient or in a previous patient from whom the infection was transmitted. Now there is no doubt that bacteria can acquire resistance to drugs in patients undergoing chemotherapeutic treatment, as was first shown in pneumococci by Maclean, Rogers and Fleming (1939) in cases of pneumonia treated with sulphapyridine. However, when consideration is taken of the widespread use of sulphonamides and penicillin there are remarkably few instances in which it has been definitely proved that the original infecting organism has acquired resistance to these drugs. With streptomycin, on the other hand, a very rapid development of a high-degree resistance is of frequent occurrence in *Ps. pyocyanea* during the treatment of urinary infections (Buggs, Bronstein, Hirshfield and Pilling, 1946). In many instances, however, especially in streptococcal infections of superficial wounds treated with sulphonamides, it would appear that the development of resistance to chemotherapeutic treatment is usually due to re-infection by more resistant bacteria after eradication of the original sensitive organisms. This replacement of sensitive bacteria by naturally resistant bacteria has also been observed on an epidemiological scale by Siegel and Karr (1945) during the prophylactic use of sulphadiazine in an epidemic of pneumococcal infections in children, and in the suppression of throat streptococci in naval training schools by Damrosch (1946). It is thus evident that unexpected resistance to chemotherapy in clinical infections is not by any means always due to acquired resistance in the infecting organism, but can also be caused by a

In the same way, penicillin, which in the usual doses employed gives concentrations in the blood stream varying approximately from 0.001 to 0.1 mgm. per 100 c.cm. (0.2 to 2 units per c.cm.), is highly effective in streptococcal and staphylococcal infections but is of relatively little value against infections caused by the gram-negative bacilli. If we now consider the data for streptomycin, which can be administered by intramuscular injection in doses of 0.3 to 0.5 gm. three-hourly, giving concentrations varying between 0.2 and 6 mgm. per 100 c.cm., we can predict that streptomycin will be much more effective than sulphathiazole and penicillin against infection with *Ps. pyocyanea*. That such is indeed the case has already been our experience, especially in urinary infections due to *Ps. pyocyanea*, some of which have rapidly resolved with streptomycin after unsuccessful treatment with other drugs.

From these examples of bacteriostatic tests it is evident that each drug has its restricted sphere of action and that none can be regarded as a panacea for any bacterial infection. Bacteriological investigations are thus of great importance in the rational treatment of infections, not only in the identification of the bacterial causes of disease but also in determining the most suitable drug on the basis of bacteriostatic tests. Furthermore, now that the range of choice of drugs is being widened there is all the more need for bacteriological work in order that the best possible choice be made with the least delay and with the least injury to the patient.

#### DRUG RESISTANCE IN BACTERIA

Wide differences in sensitivity to the bacteriostatic action of drugs are found not only in bacteria of different types, as is shown in table I, but also among bacteria of the same type. Selbie, Simon and McIntosh (1945), in an investigation of the sensitivity to penicillin of 157 staphylococci isolated from clinical infections at the Middlesex Hospital, found that, as compared with the average staphylococcus, 15 were at least 8 times more resistant, and of these 4 were 64 times and one was more than 500 times more resistant. Variations in sensitivity are also found in other types of bacteria, not only to penicillin but also to sulphonamides and other drugs. This complication has to be kept in mind when failures occur in treatment with a drug appropriate for a particular type of infection. The most notable example has been in cases of gonorrhœa which have failed to respond to sulphonamide treatment owing to the resistance of the gonococci to sulphonamides, and have subsequently cleared rapidly with penicillin.

Bacteria which are abnormally resistant to the action of a particular drug are either naturally resistant or have acquired resistance during previous exposure to the drug. Natural resistance in staphylococci, which are usually sensitive to penicillin, has been exemplified above from the work of Selbie, Simon and McIntosh, who carried out their investigation in the early days of penicillin therapy when there was little or no chance of picking up strains

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In many conditions in which the sources of infection are accessible the chances of a recrudescence of the infection can be greatly reduced by the removal of infected and avascular tissue, as in osteomyelitis, in which necrotic bone should be removed after the infection has been brought under control by penicillin. In pyogenic infections, chemotherapy alone should not be regarded as an all-sufficient treatment in every case, and the surgeon should always be ready to promote recovery by establishing drainage or removing devitalized tissue (Hudson, 1946).

The three-hourly intramuscular injection of penicillin is tedious to the patient and to the physician but there would appear to be no doubt that this is the most efficient method of administration. Continuous infusion into a vein or muscle by a drip apparatus has been widely used but the apparatus requires frequent attention and, as Hudson, Meanock, McIntosh and Selbie (1946) have shown, the average concentration of penicillin attained in the blood stream is much less than that obtained with the same dose given by the usual intermittent method. Furthermore, with the intermittent method, high concentrations of penicillin are reached in the blood immediately after each intramuscular injection, and these high peaks are of great value in promoting penetration of penicillin to deep avascular sites of infection.

Procedures that have been proposed to overcome the inconvenience of repeated injections are administration by mouth and the injection of penicillin in an oily base. Detectable amounts of penicillin can occasionally be found in the blood after the oral administration of penicillin, but the results have been so irregular that none of the methods so far proposed can be recommended. In the second method a large dose of penicillin is injected in an

secondary invasion of naturally resistant bacteria after the normally sensitive strains have been eliminated.

The question of the origin of resistant bacteria is of particular interest with regard to gonorrhœa, as there is a general impression that the incidence of sulphonamide-resistant cases is increasing because of the dissemination of gonococci that have developed resistance in cases treated inadequately with sulphonamides. There is, however, the possibility that many of the more sensitive gonococci have been eliminated by the widespread use of sulphonamides, so that the more resistant gonococci are being more frequently met with in cases of gonorrhœa. This brings us to the most important practical point that arises from our knowledge of drug-resistance in bacteria, which is that infections should always be treated with the maximum recommended dosage, especially with the sulphonamides, for it is only thus that the drug can be used to full advantage. The fact that a large proportion of infections can be cured by submaximal doses is no excuse for failure in a moiety of cases that are somewhat more resistant, or for taking the risk of creating drug-resistant bacteria. Furthermore, it is only when maximum doses have been used that it can safely be said that the infection is drug-resistant, and only then is a change to another drug indicated. It is also noteworthy that it is at this stage that the bacteriologist can give valuable help in recommending the proper drug to be used after isolating the infecting organism and testing its sensitivity to various drugs.

#### DOSAGE

*"Frapper vite et frapper fort"*, the axiom so frequently quoted by writers on chemotherapy long before the advent of the sulphonamides, is the golden rule of chemotherapy. It cannot be overemphasized that successful chemotherapy depends upon starting a full course of the drug as early in the infection as possible. *The sulphonamides* cannot be pushed beyond certain limits because of their toxicity, but this should not be a deterrent to giving maximal doses, especially in severe infections. In mild or moderate infections a somewhat lower dosage is the rule, but with these there is always the danger of severe complications or of making the infections resistant, as has been discussed above, so that the only safe procedure is to use maximal doses from the start but with due regard to the safety of the patient. For full guidance on sulphonamide dosage reference should be made to the Medical Research Council War Memorandum (1945).

The dosage of *streptomycin* is limited by its toxicity, even more than the sulphonamides. In fact, streptomycin in therapeutic doses frequently gives rise to toxic effects, so that this drug should be reserved for cases unlikely to respond to other remedies, and should be used only when the patient is under constant observation.

*Penicillin*, on the other hand, is virtually harmless to the patient, so that "maximal dosage" in this case is not limited by toxicity as with other drugs

but can only be determined on the basis of experience. It has been frequently stated that the amount of penicillin administered should be just enough to give a concentration in the blood stream sufficient to inhibit the growth of the infecting bacteria. It is, however, apparent that much more than this is required in many infections because the bacteria causing the infection are not in the blood stream but are deeply embedded in dense inflammatory tissue (Hudson, Meanock, McIntosh and Selbie, 1946). In subacute bacterial endocarditis, for example, treatment with maximal doses of sulphonamides frequently succeeded in clearing the bacteria from the blood stream but failed to get rid of the bacteria in the infective vegetations on the valves of the heart. With penicillin in moderate doses the results were similar, and it was not until the dosage was increased to 60,000 units, three hourly for twenty-eight days, that regular success in eradicating the infective process was achieved at the Middlesex Hospital (Ward, Meanock, Selbie and Simon, 1946). Dosage on this scale is now used as a routine in other grave infections and has proved a great advance on the lower doses used previously. In some cases in which bacteriological tests have shown that the infecting organism is abnormally resistant, doses up to 500,000 units three-hourly have been used with good results.

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oily base with a view to delaying absorption and so prolonging the time during which penicillin is present in the blood stream. However, tests on the blood show that it takes some time for the penicillin to reach the blood, and even then the concentration is comparatively low and often does not last longer than after an injection of the same amount of penicillin in a watery solution. There is also the objectionable feature that it takes some time for the tissues to get rid of the oily medium, so that each injection gives rise to a foreign body reaction. Apart from these theoretical objections clinical experience is now beginning to show that if only two or three injections a day can be given it is much more advisable to give large doses, 200,000 to 500,000 units, in saline or distilled water. For these reasons the administration of penicillin in an oily base cannot be recommended. Furthermore, in the presence of active infection there is no short cut to adequate penicillin therapy, that is to say, the intramuscular injection of penicillin every three hours. Anything short of this, even in apparently mild infections, is inviting the risk of dangerous complications and of inducing penicillin resistance.

Regarding other methods of administering penicillin brief mention may be made of the sucking of penicillin lozenges, and the inhalation of penicillin. The sucking of penicillin lozenges frequently leads to a sore mouth, sometimes to a condition known as black tongue, which has been ascribed to nicotinamide deficiency but is more likely to be due to upsetting the normal bacterial population and so encouraging infection of the mouth with penicillin-resistant bacteria. The inhalation of penicillin frequently has a similar effect on the bacteria in the respiratory system, sometimes leading to more intractable infections instead of benefiting the patient. It is thus evident that great care should be exercised in the local application of penicillin for oral or respiratory infections. In any event, if the tissues are infected, the bacteria causing the trouble are not on the surface but embedded in the tissues, so that they can be affected only by drug from the blood stream, that is to say, by systemic administration of sulphonamides by mouth or penicillin by injection.

### References

- Buggs, C. W., Bronstein, B., Hirshfield, W. J., and Pilling, M. A. (1946): *J. Amer. med. Ass.*, **130**, 64.  
 Damrosch, D. S. (1946): *Ibid.*, **130**, 124.  
 Hudson, R. V. (1946): "Penicillin, its Practical Application" (Ed. A. Fleming), London.  
 —, Meanock, R. I., McIntosh, J., and Selbie, F. R. (1946): *Lancet*, **i**, 409.  
 McIntosh, J., and Selbie, F. R. (1943): *Brit. J. exp. Path.*, **24**, 246.  
 Maclean, I. H., Rogers, K. B., and Fleming, A. (1939): *Lancet*, **i**, 562.  
 Medical Research Council War Memorandum No. 10 (1945): "The Medical Use of Sulphonamides," 2nd edition (H.M. Stationery Office).  
 Selbie, F. R. (1946): *Brit. med. Bull.*, **4**, 267.  
 —, Simon, R. D., and McIntosh, J. (1945): *J. Path. Bact.*, **57**, 47.  
 Siegel, M., and Karr, H. V. (1945): *Amer. J. Hyg.*, **42**, 214.  
 Ward, G. E. S., Meanock, R. I., Selbie, F. R., and Simon, R. D. (1946): *Brit. med. J.*, **i**, 383.

# PAIN AND ITS PROBLEMS

## X.—PAIN OF NON-ORGANIC ORIGIN

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PAIN of apparently non-organic origin can be referred to any portion of the body, and aches and discomforts which precede or follow these attacks of pain should also be included in this discussion if no satisfactory organic etiology can be found. The qualification "no satisfactory organic etiology" must be stressed, since the problem of these complaints raises many questions. Of these, two are especially important: if the pain cannot be ascribed to demonstrable disease does it in fact exist, is it imaginary, or is the patient malingering? Can we be absolutely certain that because no physical signs can be found no structural abnormalities have occurred? We shall be in a better position to answer these questions after description of some of these pains. They may affect any portion of the body; some sites more than others.

of any severity. The more severe they are accompanied by other complaints. They regular in onset or duration this regularity at unusual times, e.g. week-ends, on the day. Such head pains occur in as wisdom, and if the prospective, his headaches stop him. features is the tendency of the as if a weight were being if there was a band condensed hot poker were being whisked into the head". and the pain in its early remedy loses its effectiveness associated with a change in explain, and a common conditions in which others

common after the  
of differential  
s, and are often  
objective disorders  
usually sudden in  
ness accompanied

oily base with a view to delaying absorption and so prolonging the time during which penicillin is present in the blood stream. However, tests on the blood show that it takes some time for the penicillin to reach the blood, and even then the concentration is comparatively low and often does not last longer than after an injection of the same amount of penicillin in a watery solution. There is also the objectionable feature that it takes some time for the tissues to get rid of the oily medium, so that each injection gives rise to a foreign body reaction. Apart from these theoretical objections clinical experience is now beginning to show that if only two or three injections a day can be given it is much more advisable to give large doses, 200,000 to 500,000 units, in saline or distilled water. For these reasons the administration of penicillin in an oily base cannot be recommended. Furthermore, in the presence of active infection there is no short cut to adequate penicillin therapy, that is to say, the intramuscular injection of penicillin every three hours. Anything short of this, even in apparently mild infections, is inviting the risk of dangerous complications and of inducing penicillin resistance.

Regarding other methods of administering penicillin brief mention may be made of the sucking of penicillin lozenges, and the inhalation of penicillin. The sucking of penicillin lozenges frequently leads to a sore mouth, sometimes to a condition known as black tongue, which has been ascribed to nicotinamide deficiency but is more likely to be due to upsetting the normal bacterial population and so encouraging infection of the mouth with penicillin-resistant bacteria. The inhalation of penicillin frequently has a similar effect on the bacteria in the respiratory system, sometimes leading to more intractable infections instead of benefiting the patient. It is thus evident that great care should be exercised in the local application of penicillin for oral or respiratory infections. In any event, if the tissues are infected, the bacteria causing the trouble are not on the surface but embedded in the tissues, so that they can be affected only by drug from the blood stream, that is to say, by systemic administration of sulphonamides by mouth or penicillin by injection.

### References

- Buggs, C. W., Bronstein, B., Hirshfield, W. J., and Pilling, M. A. (1946): *J. Amer. med. Ass.*, **130**, 64.  
 Damrosch, D. S. (1946): *Ibid.*, **130**, 124.  
 Hudson, R. V. (1946): "Penicillin, its Practical Application" (Ed. A. Fleming), London.  
 —, Meanock, R. I., McIntosh, J., and Selbie, F. R. (1946): *Lancet*, **i**, 409.  
 McIntosh, J., and Selbie, F. R. (1943): *Brit. J. exp. Path.*, **24**, 246.  
 Maclean, I. H., Rogers, K. B., and Fleming, A. (1939): *Lancet*, **i**, 562.  
 Medical Research Council War Memorandum No. 10 (1945): "The Medical Use of Sulphonamides," 2nd edition (H.M. Stationery Office).  
 Selbie, F. R. (1946): *Brit. med. Bull.*, **4**, 267.  
 —, Simon, R. D., and McIntosh, J. (1945): *J. Path. Bact.*, **57**, 47.  
 Siegel, M., and Karr, H. V. (1945): *Amer. J. Hyg.*, **42**, 214.  
 Ward, G. E. S., Meanock, R. I., Selbie, F. R., and Simon, R. D. (1946): *Brit. med. J.*, **i**, 383.

sympathetic and parasympathetic systems, and they illustrate best the difficulty of deciding where "organic" ends and "functional" begins. Epigastric pain has been shown to occur as a result of excessive gastric movements stimulated by the emotion of rage, and similar changes with appropriate symptoms may follow fear and hunger. In such cases in which no abnormality in the hypothalamus can be postulated there is definitely a connexion between emotion and function which is mediated *via* the sympathetic nerves. Are such disorders functional or organic? The second is that in the hypochondriac's persistent desire to be examined and to expose himself to our gaze, we have an example of the refusal of the chronic neurotic to accept reassurance and of his choice of exhibitionism rather than solid fortitude. Further, as in other examples of this subject, the scarred abdomen too often tells the tale of optimistic surgery unimpeded by healthy scepticism and sufficiently rigorous listening to symptoms; whilst when the pathologist is asked to enlarge upon his diagnosis of "submucous small-celled infiltration of the appendix" he cannot give you at all a clear idea of the process at work.

Have these various pains anything in common except absence of appropriate physical signs? Superficially, very little. Yet there is about many of them an emphasis on the relatively crippling nature of the symptoms. However bold a face the patient puts upon it there is some work, duty or pleasure that the symptom prevents. Secondly, there is often evidence that the pain follows a period of inexplicable exhaustion, not the relatively common tale of pain leading on to exhaustion. Thirdly, if exhaustion has not been present, clearly emotional disorders (relatively mild) may be admitted as having preceded the pain—phobias of travelling, an acuter attack of obsessional scrupulosity, and so on. It is more economic of time to note these accompanying disorders than to initiate endless physical examinations which are likely to arouse rather than dispel the patient's apprehension.

There is a fourth point worthy of comment. If the symptoms are not organically determined it is remarkable how easily the patient will complain about the former treatment which he has received, about his lot in general. These are marks of the hysterical personality, the individual prone to express his dissatisfaction through complaints of pain. A readily aroused resentment or self-pity, whilst not diagnostic of functional disorder, is highly suggestive of it.

The diagnosis of non-organic pain should not wait until every conceivable physical rarity is excluded. It should be a positive diagnosis depending upon close scrutiny of the history given, rather than upon many ancillary examinations which prove negative. Such a conclusion should be reached on the basis of wide clinical experience in the natural history of disease, together with an acquired appreciation of the behaviour of the person who seeks relief from his problems in psychosomatic illness.

by quite unreasoning resentment of the unfortunate dentist), and seem to be as intractable as a severe hypochondriasis.

*Facial pain.*—Facial pain without an organic basis occurs without the spasms of *tic doloieux* or the time frequency of sinusitis. Because of the dramatic course of a neuralgia some individuals are subjected to trigeminal injections when the actual distribution and onset of the pain is unlike either the celebrated tic, or those neuralgias of various branches of the fifth nerve which occur as a result of exhaustion or exposure and are strictly limited anatomically—supra-orbital, auriculo-temporal, lingual.

*Inframammary pain.*—This pain is usually a dull ache, it is more common on the left than on the right side, it may be associated with exhaustion, but palpitations are hardly ever spontaneously complained of, although the patient may answer a leading question affirmatively. It is frequent in the syndrome of cardiac neurosis called "effort syndrome". Inframammary pain may radiate, but I have the impression that this quality is iatrogenic, i.e. suggested by the doctor.

*Pelvic complaints.*—In these, aches are commoner than pain, but the clamant nature of the complaint justifies its inclusion here. Many, if not all, gynæcologists believe that spasmodic dysmenorrhœa is functional rather than organic, and persistent backaches and lower abdominal discomfort assumed to be pelvic in origin have a most discouraging way of returning after the insertion of rings, colporrhaphies, and fixation operations.

*Genito-urinary pain.*—Persistent pain in the penis with or without erection is usually psychogenic, as is vaginismus continuing after the hymen has been broken.

*"Rheumatic" pain.*—It is now recognized that much rheumatic pain occurs without demonstrable pathology in persons emotionally disturbed and can often be modified by adjustment of the current problems. No satisfactory description of the multiplicity of pains called "fibrositis", and the like, which seem to occur in the emotionally upset, can be given, so protean are they. Description of their qualities and time of occurrence frequently reveal their origin. I have been struck by the frequency with which pain in or near a joint has been immediately dubbed "rheumatic" when a moment's waiting for the patient to *describe* the quality of the pain, which he may do in somewhat remarkable language or simile, will awaken suspicion of the complaint's non-organic etiology.

*Pains following immobilized joints or peripheral nervous disease.*—The pain of "sciatic neuritis" should have passed in six weeks, as should pain following immobilization of joints. Persistence of such pain, which will in quality mimic the original pain, should arouse suspicion that the complaint continues for reasons associated with emotional stress or fatigue.

*Gastro-intestinal and hypochondriacal pains.*—I have left to the last a description of these disorders for two reasons. The first is that many of these complaints may arise from an imbalance between the stimuli of the

tration, his mind (or his head) does not work. The less intelligent expresses the same experience "My head (or my mind) aches". Similarly, infra-mammary pain, is, I think, much more common in the hospital class of patient. He is saying "My heart pains me" instead of as the more intelligent persons says "I'm broken hearted with grief or remorse". Pains which are symbolic of the patient's problems are certainly met with. One such instance of "my heart aching" has just been mentioned. "I can't hold up my head because of the pain (of my shame)", "I can't straighten my back (I am bowed down with remorse)", also represent possible somatic expressions of the turmoil of mind. But the very attractiveness and simplicity of such explanations should make one cautious before accepting them.

We are on firmer ground in finding that pain in the penis following marital infidelity has an escapist purpose. It prevents further escapades. It diverts the blame from the offence on to the patient's body. He seeks the treatment of the physician who will have the onus of blame laid upon his shoulders if the symptom continues, whereas the priest will lay the onus upon the patient's own. Similar pains have followed in an arm which has done violence, or in eyes that have spied too greedily, and in each case the sufferer seems neither able to forgive his fall from rectitude nor to plan a secure future free of such moral failures. The pain averts any decision between such conflicting problems.

Psycho-analytical writings detail many other examples of pain, and it may well be that the description given above is theoretically too simple. One other example of the cause of pain may be given as regards head pains. One of the most common sites is occipital. In these cases the pain may actually be muscular. One patient of mine with this symptom was so frightened of others looking at him that he had to carry a paper in front of his eyes throughout all his train journeys—the pain was not present when he relaxed. In giving such an example it should be recognized how it implies an attitude of awareness to both physical and psychological aspects in these matters, and the best assurance of clinical acumen will come from experience both in the organic and functional fields.

The answer to the first two questions raised can now be given. Symptoms as the persistence of previously felt pain do occur, and they gain significance, not only from the characters of a previous attack, but from the apprehensions which surround their recall. They are only imaginary in so far as they occur within the mind, but the feeling-tone of these experiences may be just as unpleasant as pressure upon an exposed nerve\*. I do not believe that because no physical signs can be elicited therefore no abnormalities have occurred. But I believe the wisdom of the body to be such that pain of functional

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\*Freeman, the foremost exponent of prefrontal leucotomy in the U.S.A., avers that the intolerable nature of some organic pains may be removed by section of the fronto-thalamic fibres.

## THEORIES OF NON-ORGANIC PAIN

What pathological process underlies these variegated symptoms? We are faced with several paradoxes. Why do other individuals with more severe pathological processes, e.g. minor astigmatism, hypertonic stomachs, osteoarthritic changes, cervical erosions, suffer fewer symptoms? How is it that although no satisfactory pathology can be found, some of these patients demonstrably appear to be in pain, haggard, possibly sweating, certainly tired?

Let us assume that because we can find no physical signs we are dealing with psychogenic pain, or better, that without endless supplementary examinations we are convinced the symptoms are psychogenic. This should not blind us to the possibility that some hitherto undiscovered psycho-physiological process is at work. In the curious phenomenon of phantom limb which may persist painlessly or painfully after an amputation, an organic process from the ends of the severed nerves is probably at work even when no neuroma is to be found and no sepsis has existed.

A sufficiently detailed history in these cases of non-organic pain more often than not shows that the part affected has been the site of former trauma, infection, or over-solicitation. Such a connexion is not difficult to trace when sciatic "pain" persists for months after sciatic neuritis, and it is not so infrequently found that pain persists in injured parts even when no question of financial compensation exists. These types of pain may be explained in terms of the old formal psychology, as the result of percepts followed by images, and images followed by ideas. Whilst ideas tend to lose their vividness in the course of time, if they are constantly stimulated by attention they will persist, at any rate to a great extent, and such attention is implied in the fear about an injured part. But such morbid attention will only continue if the total amount of a patient's attention is not distracted by more satisfactory images and ideas. In the case of the hypochondriac this lack of attention to suitably satisfying interests is marked. As the sensations of the painless phantom limb may return at periods of emotional distress, so also it may be postulated that the somatic sensations from parts of the body which have hitherto been the seat of trauma, infection or concern, may enter consciousness under conditions in which the mind is either not fully occupied, or is unsatisfactorily busied with emotional problems.

A purely psycho-physiological explanation of these matters will not, however, fulfil all the clinical types. The complaint of *headache* may be made by a patient of poor intelligence when he is actually suffering from depression, and his inability to verbalize his feelings may cause the physician to overlook the suicidal risk even though the man has lost weight and is full of self-blame. I believe that the "headache" in these instances is an attempt to express in the simple concrete language of the unintelligent his present handicaps. The intelligent man suffering from depression lacks concen-

# REVISION CORNER

## ANTACIDS

In the present state of knowledge it would seem reasonable to prescribe antacids for the relief of symptoms associated with peptic ulceration and hyperacidity, and to reduce the degree of gastric acidity, but not to attempt 24-hourly control, save in exceptional circumstances.

### DIET

Milk itself is an excellent antacid and has formed the basis of most diets in the past. However, a bland diet selected from normal articles of food is better still and actually has a higher neutralizing power. Semi-solids remain in the stomach longer than fluids, and protein itself is a good antacid. Fats close the pylorus and delay emptying; hence the value of olive oil.

Such a diet should be neither irritating nor stimulating and, if well balanced, will maintain a good state of nutrition. Its precise constitution can be varied to suit individual needs. This form of antacid therapy is thus the simplest to arrange and at the same time will be found the most effective. In the early acute stage, it can be given in the form of minces, mash, purées and soufflés, but later on it is sufficient to rely on thorough mastication. Frequent small feeds are best. During convalescence and after returning to work, milk can easily be carried about in a flask to drink between meals in the middle of the morning and afternoon. A snack should be taken at bedtime and a milky feed, together with a dose of powder, should be kept at the bedside to be taken on waking during the night and first thing in the morning.

### ANTACID DRUGS

Antacid drugs can always be given to relieve pain, and most practitioners still prefer to prescribe one such preparation four to six times a day, at least during the early stages of treatment. Sodium bicarbonate is easy to come by and is quickly effective but is unsuitable for prolonged administration, mainly because it is too soluble. Nevertheless, it is a usual constituent of traditional prescriptions and proprietary preparations, most of which also contain varying proportions of magnesium carbonate, calcium carbonate and bismuth oxycarbonate. These drugs have various side-effects which may be disadvantageous; thus, magnesium salts are laxative and calcium salts the reverse. All carbonates, and especially bicarbonates, liberate  $\text{CO}_2$  but the ill-effects of such gas production have been exaggerated. Actually, any subsequent breaking of wind affords considerable relief and satisfaction.

Bismuth is a weak antacid of no special value. It does not form the nice protective coat so easily imagined, and is rather expensive. The B.P.C. compound bismuth powder is as effective a combination as any and contains one part each of sodium bicarbonate and bismuth carbonate and three parts each of calcium carbonate and magnesium carbonate. Sometimes it is convenient to order two powders with dissimilar effects on the bowels so that the patient may vary the amount of each at will:—

- (1) Equal parts of magnesium carbonate and sodium bicarbonate.
- (2) Equal parts of calcium carbonate and sodium bicarbonate.

Similar preparations may be dispensed in tablet form or as mixtures to suit individual needs. For intermittent use, sufferers from dyspepsia will find soda mint tablets (B.P.C.) very convenient, and bismuth and sodium bicarbonate mixture [B.P.C. preparation contains 10 grains (0.65 gm.) each of bismuth carbonate, sodium carbonate and light magnesium carbonate] has stood the test of time for those who prefer a mixture.

Cream of magnesia [mixture of magnesium hydroxide B.P., 60 to 240 minims (3.5 to 14 c.cm.)], is a pleasant preparation for those who require a combined antacid and mild purgative. Tribasic magnesium phosphate (B.P.C.) is another preparation



disease quite as clearly calls for treatment as pain of organic disease, or the application of the best methods for alleviating or tolerating it.

As regards the question why a patient with non-organic pain may appear so haggard and ill, the answer rests upon the fact that many individuals of this type are really ill, but in a mode which clinical teachers have not emphasized. It is possible to cure psychogenic pain only to find the cured patient becoming actively suicidal. In the last case he is demonstrably ill. Is it too unlikely that the previous symptoms which seemed to overlay latent suicidal impulses are unaccompanied by evidence appreciated as clinical illness?

#### THE TREATMENT OF NON-ORGANIC PAINS

This treatment is fundamentally a problem of common sense in the doctor and in the patient. Taking the patient first, it may be argued that the patient is obviously lacking in it. He is suffering from pain, he even looks ill, when he might make quite a simple change in his life and become completely free of symptoms. He continues to lack common sense (we feel) when he will not be reassured. He blames us for saying (which we did not) that his symptoms were imaginary.

We are faced with pain which we are sure is psychogenic. We have to explain our belief in its reality by giving the patient examples of such pain occurring in ourselves or in others under conditions of strain. To the intelligent we can give the example of examination-staleness and headache; to the artisan the example of increasing pain when toothache is accompanied by other unhappiness, and its relative quiescence if the patient is adequately occupied in excitement, e.g. witnessing a boxing match. We have to convince him that we are not going to go on hunting for mythical causes of the pain because he wants us to. And here that divine mixture of firmness and sympathy is never more needed. Although it is true enough that the patient comes first, he must, for this very reason, have facts when they are necessary. The patient can be assured that he will have medicine when we know why the pains occur, but he will not have medicines in order to cloak our own ignorance. He is likely, except in cases of the grossest hysteria, to sleep badly. He needs hypnotics for this, but he needs to feel also that his symptoms are the result of disordered function, which we must help him to put right.

The patient with pain of non-organic nature is aware of it because he is inadequately occupied, or his time is improperly filled, i.e., by being filled with pursuits or anxieties which are inappropriate for him. This must be changed. And it should be changed partly because we offer him the medicinal help which we properly can, and the social and moral help which psychogenic disorder implies. This may imply much skilled psychotherapy, but in the beginning of these cases discreet wisdom and fundamental sincerity between doctor and patient will achieve gratifying results.

age of the patient, her mental and social status, the nature of the malady from which she is suffering, and the number of living children she already has.

#### MEDICAL-LEGAL CONSIDERATIONS

The law regarding sterilization is obscure but it is probably illegal unless performed for a therapeutic indication. Sterilization on eugenic grounds is probably not legal, although no medical practitioner has ever been prosecuted or sued for performing an operation to sterilize a woman. The consent of the patient, or in the case of a minor of her legal guardian, is of course necessary for this, as for any operation. Written consent should be obtained and the nature and purpose of the operation stated on the declaration signed by the patient before the operation is performed. It is usual to get the patient's husband also to give his written consent, although such consent is not legally necessary.

#### MEDICAL INDICATIONS FOR STERILIZATION

There is a number of medical conditions which may demand sterilization. The decision will depend, as always, upon the careful consideration of each case. Consultation with a senior colleague, preferably one with wide experience in the malady from which the patient is suffering, is always advisable.

*Heart disease* forms one of the most frequent of the medical indications and the majority of these patients are suffering from rheumatic heart disease. The decision will often depend upon the cardiac function in a previous pregnancy. Any patient who has been in congestive cardiac failure or who suffers from auricular fibrillation is an unsuitable subject for pregnancy. If breakdown of cardiac function has taken place in a previous pregnancy, or if at the end of the pregnancy there are symptoms of cardiac embarrassment in the form of extreme breathlessness, sterilization should be performed. Cardiac patients should generally be advised to have only two or three children even in the most favourable circumstances, and sterilization should therefore be performed after the third pregnancy unless the patient is nearing the menopause or prefers to use contraceptives.

Certain *diseases of the respiratory system* may call for sterilization, the two chief being pulmonary tuberculosis and bronchiectasis. The situation with regard to tuberculosis is often difficult and it must always be remembered that it is a disease from which complete recovery may occur. However, if a patient has several living children, and especially if a recent pregnancy has led to exacerbation of the disease, sterilization may be considered.

*Diabetes* may also be an indication for sterilization, especially if the patient already has two or more living children and the diabetes is difficult to control. There are also many miscellaneous medical conditions which may call for sterilization. In these cases the operation will be carried out after careful consultation with a physician.

*Psychiatric disorders.*—Sterilization may also occasionally be indicated on psychiatric grounds. A particular example is the patient who has had a mental breakdown, even reaching reproductive insanity, on one or more occasions in a previous pregnancy. The opinion of a psychiatrist should be sought before the operation is performed.

#### OBSTETRICAL INDICATIONS FOR STERILIZATION

These may be summed up under three main headings, although these are by no means inclusive and certain conditions which occasionally call for sterilization are not mentioned.

First, any condition which calls for *repetition of Cesarean section* in every pregnancy. The most common cause for this is severe bony contraction or deformity of the pelvis. It is generally agreed that sterilization should be performed at the third

in common use which produces a neutral solution in the stomach and has a mild laxative action.

These official preparations, and a host of more expensive if more elegant proprietary products, serve well enough for intermittent use and the temporary relief of symptoms. If taken regularly, alkalosis is always a potential risk, especially in the presence of anæmia or vomiting. Individual susceptibility varies and the condition, although not common, may be unsuspected and hence dangerous.

For the systematic treatment of peptic ulcer, these alkalis have been largely superseded by the *insoluble neutral antacids* whose action has been abundantly confirmed. Some patients find them rather slow to act and not quite so effective in relieving pain but, for prolonged usage to reduce acidity, they are safe and reliable.

Aluminium hydroxide (B.P.C., or the proprietary aludrox, aloecol, hydronal), is a white, insoluble tasteless powder which neutralizes the acid gastric juice just as well as the common alkali preparations and has no undesirable side-effects.

Magnesium trisilicate (novasorb, magsorbent, gastomag), is another insoluble powder and reacts slowly with hydrochloric acid, thus providing an even rate of neutralization. It is not only an effective antacid but has valuable adsorbent properties as well. Either of these substances may be freely taken at any stage of the treatment of an ulcer or following a hæmatemesis. They are also useful for other forms of dyspepsia, even in the absence of hyperchlorhydria.

Whatever the precise official doses, all these antacid powders may be safely given to adults in teaspoonful doses.

#### ATROPINE

Atropine used to be given with a view to reducing gastric secretion, especially at night, but it is now realized that it has little such action. However, atropine does reduce hypermotility and spasm and helps to relieve pain. It must be given in full dosage, that is to say, just short of that producing toxic effects and can be taken as tincture of belladonna [30 minims (1.8 c.cm.), three to four times a day] or atropine sulphate [ $1/75$  grain (0.70 mgm.), three to four times a day].

#### CONCLUSION

These, then, are the essential features of antacid therapy. First, do everything possible to help the patient to acquire peace of mind and body. Next, arrange a bland, well-balanced diet to suit individual needs and tastes. Milk should be given between feeds and during the night, if awake. Soluble antacids should be given for the relief of pain and one of the insoluble preparations to reduce hyperchlorhydria may be prescribed, four to six times a day during the active phase.

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### INDICATIONS FOR STERILIZATION IN WOMEN

STERILIZATION in women is indicated in the presence of a condition which is likely to endanger or shorten life or to lead to impairment of health if pregnancy occurs. In a case in which it is decided that a future pregnancy is undesirable two alternatives exist, sterilization and contraception. The choice of method will depend upon a number of circumstances, all of which must be weighed up in a given case. Sterilization is almost entirely safe, but it is virtually permanent and thus irrevocable. It does, however, require an operation. Contraception is also safe if a reliable method is used and conscientiously and intelligently applied by the patient. Many patients, and especially those of the hospital class, find it difficult or impossible to use contraceptives. In a young patient particularly, sterilization may be preferred as the safer method and one which relieves the patient's mind from the recurring anxiety of becoming pregnant. The choice will depend upon several factors, including the

## CHRONIC OR POSTURAL ULCERS

Chronic or postural ulcers are encouraged by five conditions—pressure, trauma, malnutrition of the skin, maceration, and general debility.

*Pressure.*—Decubitus ulcers occur over bony prominences, especially the sacrum, trochanters and heels. It is therefore important to utilize as large a surface as possible for weight bearing, and the position of the patient must be frequently changed. Cotton-wool “nests”, air cushions and water-beds are all useful in order to distribute pressure.

*Trauma.*—Injury to the skin is preventable and nurses in charge of the case should keep a watchful eye for wrinkles in the draw-sheet, or harshness of the linen. Only the finest dusting powder should be used, as small pieces of grit will excoriate the skin if powder is applied vigorously. Vulnerable areas of skin should be protected by “elastoplast”.

*Malnutrition of the skin* is discouraged by scrupulous cleanliness and the use of stimulating and astringent preparations. Once a day, or more frequently if necessary, the skin is sponged, dried with a soft towel, rubbed with surgical spirit, and finally powdered with either dermatol (bismuth subgallate) talcum powder or equal parts of boracic acid, zinc oxide and starch.

*Maceration* of the skin results from either sweat, urine, fæces or pus. Measures to prevent the contact of these substances with the skin belong to the domain of skilled nursing, which is of paramount importance in dealing with decubitus ulcers.

*General debility* must receive due attention, as the recuperative power of the skin, in common with other tissues, depends to a large extent upon the well-being of the patient. Nourishing food, vitamins, tonics, and perhaps alcohol in moderation, especially in elderly patients, are important considerations. If the patient is listless and apathetic, benzedrine tablets (10 mgm. on waking and 5 mgm. at noon) may stimulate interest in life and the desire to regain health as rapidly as possible. Although the patient be non-diabetic, the administration of insulin (10 units daily) is worthy of trial in an obstinate case.

## LOCAL TREATMENT

A decubitus ulcer develops in three stages—threatened, inevitable, and actual ulceration.

*Threatened.*—Erythema occurs over the threatened area, but the redness of the skin disappears on digital pressure. Moist dressings are contraindicated, and the part should be protected from further pressure. The application of “elastoplast” often prevents further developments, otherwise the skin should be bathed frequently with some astringent, such as silver nitrate solution, 5 per cent.

*Inevitable.*—Local congestion occurs which does not disappear on digital pressure. The application of tannic acid, 5 per cent., by means of a spray will protect and splint surrounding skin, and minimize the extent of ulceration.

*Ulceration* presents a difficult problem. The recent war has stimulated interest in operative procedures, and excision and subsequent skin grafting have already been mentioned. Good results have been obtained in the trochanteric area by the use of rotation flaps after excision of the ulcer. If operative treatment is not considered advisable, small ulcers should be covered with “elastoplast” strips, which are applied without stretching. The strips are allowed to remain in position until they are lifted off the tissues by discharges from the ulcer.

Larger ulcers are dressed with such antiseptics as the surgeon considers advisable, bearing in mind that a frequent change of antiseptic is beneficial, as organisms appear to become tolerant to any one preparation. Ichthyol, 10 per cent. in glycerin, is one of the best applications for cleaning a “dirty” ulcer, and short wave diathermy is a valuable adjunct in the promotion of healing.

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Cæsarean section, although cases have been reported in which a patient has refused to agree to this course and has successfully undergone as many as seven sections.

The second group comprises certain types of the *toxæmias of late pregnancy*, including essential hypertension in pregnancy and chronic nephritis and pregnancy. Patients with chronic nephritis of any but the mildest degree and with malignant hypertension are unsuitable subjects for pregnancy. It must be remembered that in severe degrees of these maladies the expectation of life is short and the chance of pregnancy remote. Chronic nephritis, however, of moderate severity calls for sterilization, especially if there has been recent exacerbation as a result of pregnancy. Essential hypertension is a different problem and one on which it is less easy to be dogmatic. Some patients undergo several pregnancies with no exacerbation of the disease. If the pressure is 150/100 mm. Hg or over the outlook for child-bearing is not good. Sterilization may be performed in a patient whose pressure is high and especially if she already has living children or has experienced exacerbation of the disease in more than one pregnancy.

*Multiple pregnancies.*—The third group of obstetrical problems which call for sterilization, and one which has received prominence in recent years, is that of the multipara. It has been shown from statistics of child-bearing that after the fourth pregnancy, the risk of childbirth increases gradually, until at the eighth pregnancy and after it is many times higher than the risk in the first pregnancy. Many authorities do not hesitate to recommend sterilization after the eighth pregnancy.

Sterilization may be performed in a patient who is not pregnant but in whom it is considered that child-bearing constitutes a grave risk. It may also be performed when termination of pregnancy is carried out by the abdominal route, or after Cæsarean section. It must be emphasized that it is never justifiable to perform Cæsarean section solely for the purpose of sterilizing the patient. If sterilization is indicated, but Cæsarean section is not, it is best to allow spontaneous delivery and sterilize during the puerperium. The operation may be performed within a few hours or days after delivery, and it is advisable to perform it early. The uterus at this time is an abdominal organ; the operation is easy and may be performed if necessary under local anæsthesia. There is a minimum of interference with lactation, and convalescence need hardly be prolonged after the normal lying-in period.

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## BED-SORES

BED-SORES, or decubitus ulcers, are of two types, acute or trophic, and chronic or postural.

### ACUTE OR TROPHIC ULCERS

The acute type is associated with nervous phenomena, more particularly paraplegia, and in spite of the most devoted and skilled nursing an acute bed-sore is apt to develop rapidly within a few days, and present itself as a ghastly area of destruction within a matter of two or three weeks. Little can be done to prevent extension, and if the patient survives long enough the sacrum may separate as a mass of necrosed bone. Fortunately, the patient is usually unaware of the extent of the destruction, and commonly succumbs to cystitis and ascending infection of the kidneys.

*Treatment.*—In less severe cases, and particularly if paraplegia is incomplete, excision of an acute ulcer, followed by skin grafting, is a practical proposition. This method of treatment was found to be of value during the recent war; for example, Donald E. Barker (*J. Amer. med. Ass.*, 1945, 129, 160) reported a series of cases in which the ulcer was completely excised as soon as a line of demarcation became apparent. The raw area was then dressed with penicillin and petrolatum ointment, and when the wound was clean a split skin graft was applied.

## CHRONIC OR POSTURAL ULCERS

Chronic or postural ulcers are encouraged by five conditions—pressure, trauma, malnutrition of the skin, maceration, and general debility.

*Pressure.*—Decubitus ulcers occur over bony prominences, especially the sacrum, trochanters and heels. It is therefore important to utilize as large a surface as possible for weight bearing, and the position of the patient must be frequently changed. Cotton-wool “nests”, air cushions and water-beds are all useful in order to distribute pressure.

*Trauma.*—Injury to the skin is preventable and nurses in charge of the case should keep a watchful eye for wrinkles in the draw-sheet, or harshness of the linen. Only the finest dusting powder should be used, as small pieces of grit will excoriate the skin if powder is applied vigorously. Vulnerable areas of skin should be protected by “elastoplast”.

*Malnutrition of the skin* is discouraged by scrupulous cleanliness and the use of stimulating and astringent preparations. Once a day, or more frequently if necessary, the skin is sponged, dried with a soft towel, rubbed with surgical spirit, and finally powdered with either dermatol (bismuth subgallate) talcum powder or equal parts of boracic acid, zinc oxide and starch.

*Maceration* of the skin results from either sweat, urine, faeces or pus. Measures to prevent the contact of these substances with the skin belong to the domain of skilled nursing, which is of paramount importance in dealing with decubitus ulcers.

*General debility* must receive due attention, as the recuperative power of the skin, in common with other tissues, depends to a large extent upon the well-being of the patient. Nourishing food, vitamins, tonics, and perhaps alcohol in moderation, especially in elderly patients, are important considerations. If the patient is listless and apathetic, benzedrine tablets (10 mgm. on waking and 5 mgm. at noon) may stimulate interest in life and the desire to regain health as rapidly as possible. Although the patient be non-diabetic, the administration of insulin (10 units daily) is worthy of trial in an obstinate case.

## LOCAL TREATMENT

A decubitus ulcer develops in three stages—threatened, inevitable, and actual ulceration.

*Threatened.*—Erythema occurs over the threatened area, but the redness of the skin disappears on digital pressure. Moist dressings are contraindicated, and the part should be protected from further pressure. The application of “elastoplast” often prevents further developments, otherwise the skin should be bathed frequently with some astringent, such as silver nitrate solution, 5 per cent.

*Inevitable.*—Local congestion occurs which does not disappear on digital pressure. The application of tannic acid, 5 per cent., by means of a spray will protect and splint surrounding skin, and minimize the extent of ulceration.

*Ulceration* presents a difficult problem. The recent war has stimulated interest in operative procedures, and excision and subsequent skin grafting have already been mentioned. Good results have been obtained in the trochanteric area by the use of rotation flaps after excision of the ulcer. If operative treatment is not considered advisable, small ulcers should be covered with “elastoplast” strips, which are applied without stretching. The strips are allowed to remain in position until they are lifted off the tissues by discharges from the ulcer.

Larger ulcers are dressed with such antiseptics as the surgeon considers advisable, bearing in mind that a frequent change of antiseptic is beneficial, as organisms appear to become tolerant to any one preparation. Ichthyol, 10 per cent. in glycerin, is one of the best applications for cleaning a “dirty” ulcer, and short wave diathermy is a valuable adjunct in the promotion of healing.

R. J. McNEILL LOVE, M.S., F.R.C.S.

Cæsarean section, although cases have been reported in which a patient has refused to agree to this course and has successfully undergone as many as seven sections.

The second group comprises certain types of the *toxæmias of late pregnancy*, including essential hypertension in pregnancy and chronic nephritis and pregnancy. Patients with chronic nephritis of any but the mildest degree and with malignant hypertension are unsuitable subjects for pregnancy. It must be remembered that in severe degrees of these maladies the expectation of life is short and the chance of pregnancy remote. Chronic nephritis, however, of moderate severity calls for sterilization, especially if there has been recent exacerbation as a result of pregnancy. Essential hypertension is a different problem and one on which it is less easy to be dogmatic. Some patients undergo several pregnancies with no exacerbation of the disease. If the pressure is 150/100 mm. Hg or over the outlook for child-bearing is not good. Sterilization may be performed in a patient whose pressure is high and especially if she already has living children or has experienced exacerbation of the disease in more than one pregnancy.

*Multiple pregnancies.*—The third group of obstetrical problems which call for sterilization, and one which has received prominence in recent years, is that of the multipara. It has been shown from statistics of child-bearing that after the fourth pregnancy, the risk of childbirth increases gradually, until at the eighth pregnancy and after it is many times higher than the risk in the first pregnancy. Many authorities do not hesitate to recommend sterilization after the eighth pregnancy.

Sterilization may be performed in a patient who is not pregnant but in whom it is considered that child-bearing constitutes a grave risk. It may also be performed when termination of pregnancy is carried out by the abdominal route, or after Cæsarean section. It must be emphasized that it is never justifiable to perform Cæsarean section solely for the purpose of sterilizing the patient. If sterilization is indicated, but Cæsarean section is not, it is best to allow spontaneous delivery and sterilize during the puerperium. The operation may be performed within a few hours or days after delivery, and it is advisable to perform it early. The uterus at this time is an abdominal organ; the operation is easy and may be performed if necessary under local anaesthesia. There is a minimum of interference with lactation, and convalescence need hardly be prolonged after the normal lying-in period.

JOSEPHINE BARNES, D.M., M.R.C.P., F.R.C.S., M.R.C.O.G.

## BED-SORES

BED-SORES, or decubitus ulcers, are of two types, acute or trophic, and chronic or postural.

### ACUTE OR TROPHIC ULCERS

The acute type is associated with nervous phenomena, more particularly paraplegia, and in spite of the most devoted and skilled nursing an acute bed-sore is apt to develop rapidly within a few days, and present itself as a ghastly area of destruction within a matter of two or three weeks. Little can be done to prevent extension, and if the patient survives long enough the sacrum may separate as a mass of necrosed bone. Fortunately, the patient is usually unaware of the extent of the destruction, and commonly succumbs to cystitis and ascending infection of the kidneys.

*Treatment.*—In less severe cases, and particularly if paraplegia is incomplete, excision of an acute ulcer, followed by skin grafting, is a practical proposition. This method of treatment was found to be of value during the recent war; for example, Donald E. Barker (*J. Amer. med. Ass.*, 1945, 129, 160) reported a series of cases in which the ulcer was completely excised as soon as a line of demarcation became apparent. The raw area was then dressed with penicillin and petrolatum ointment, and when the wound was clean a split skin graft was applied.

thickened cartilaginous rim around the end of the skin, and the ensuing stenosis prevents retraction of skin over the glans. There is no evidence of infection to account for these events and I make sure I remove adequate redundant tissue by stretching the skin forward after grasping with two Spencer Wells's forceps. Where is the fault in my operative technique and how does one overcome the difficulty without giving up the attractive hæmostatic method of the bone-cutting forceps?

REPLY.—The method described has little to recommend it beyond the authority of a great name and the tradition of rabbinical practice. When the skin and mucous membrane are divided at the level of the meatal orifice, they tend to return to that level and to heal there, however much they have been pushed back and stuck down; they heal all the more clumsily because they are not approximated, and the final result is apt to be, not circumcision, but a short prepuce with a rigid opening in place of the previous long and dilatable one. The aim of circumcision is to leave the penis covered with unscarred epithelium, clothing it loosely, but not coming beyond the corona. The epithelial covering is derived from skin united to mucous membrane, so that the skin must be divided proximal to the corona to the extent of the width of the collar of mucous membrane that will be turned down to meet it. Skin and mucous membrane must be sutured to give a linear scarless junction and avoid the healing by granulation that the questioner describes. After the prepuce has been fully freed from the glans, it should be drawn forward again and *allowed to lie naturally, while the line of the corona is marked by iodine, a scratch or artery forceps*. The prepuce is then drawn well forward and divided along this line (which lies at nearly 45° to the long axis of the penis, the frenal end being more distal than the dorsal end); the cut may very well be made with bone forceps after making sure that the meatus is safe. On separating the cut edges, the skin covering slips down to its natural level just proximal to the corona. The mucous membrane is now turned back and trimmed off with scissors to a cuff not more than ¼-inch wide except at the frenum, which is left long. After hæmostasis the two edges of the frenum are approximated by a stitch, which also picks up the extreme edge of the raphe on the skin of the penis. The rest of the mucous cuff is united to the skin edge by interrupted stitches, three a side, placed with the exactness of a plastic surgeon. No. 6 eyeless needles with oo catgut are best for this purpose. The dressing is immaterial; it will be soaked with urine any-

way, but the stitches will not need removal and the wound will be healed in three or four days without thickening or granulation.

HENEAGE OGILVIE, K.B.E., M.CH., F.R.C.S.

### *Disseminated Sclerosis*

QUERY.—A patient, female, aged fifty-six, has disseminated sclerosis of many years' standing. Amongst her many symptoms is one that troubles her more than all the others, to wit, spasmodic jerking, flexural contractions of the muscles at the hip joints on both sides. Is there any form of treatment which might help her to obtain sleep by keeping down the frequency and violence of these contractions?

REPLY (from a neurologist).—Involuntary reflex movements of the lower limbs are best influenced medicinally by the barbiturates, and phenobarbitone is perhaps the best. If it is to be employed for night use only, 1 grain (65 mgm.) or 1½ grains (0.1 gm.) would be required. If the spasms are painful an analgesic might have to be added, either two tablets of veganin or 5 minims (0.3 c.cm.) of nepenthe. The position of the limbs is important to ensure that there is no tension on the flexor muscles and that the bedclothes are not in contact with the feet so as to diminish the stimuli capable of provoking these movements. Daily passive movements, especially in a bath, are very helpful in diminishing the spasticity and liability to spasms.

### *The Sequence of Effects of Morphine*

QUERY.—I have read that the "soothing" effect of morphine appears later than the respiratory depression. Can you kindly clarify the sequence of the main effects of morphine?

REPLY.—The statement is essentially correct. The sequence of effects when morphine is given has been elucidated largely by the observations of SeEVERS and Pfeiffer (1936), and Wolff *et al.* (1940). There is a definite dissociation of effects. The effect on respiration is seen with doses insufficient to produce sleep and occurs within fifteen minutes after intramuscular injection. The peak analgesic action occurs sixty to ninety minutes after injection. The sedative effect outlasts that on the pain: there is some evidence that it comes on earlier than the full analgesic effect. There is, of course, considerable individual variation. In general, however, it is advisable to administer morphine hypodermically one to one-and-a-half hours before the induction of anaesthesia, so that the peak of the respiratory depressant action is passed.

PROFESSOR E. J. WAYNE, M.D., F.R.C.P.



## NOTES AND QUERIES

### *Status Lymphaticus*

QUERY.—What is "status lymphaticus" and why is it associated with sudden death under anaesthesia? How may it be detected, clinically or radiologically, prior to operation?

REPLY.—The "status" is, in fact, only a status—a kind of constitutional state in which there is undue prominence in the development of the lymphatic tissues. It is undoubtedly sufficiently pronounced to attract attention in many children. It is not a disease and cannot cause death.

As a result of an analysis of 600 cases of sudden death in apparently healthy people of fifteen years or over who had an abnormally large thymus, Young and Turnbull (1931) found no evidence to show that it was a pathological entity. Bratton (1925) emphasized the variations in size of the thymus in health, and Greenwood and Woods (1937) concluded from a most extensive study made for the Pathological Society that they could not assign "the least importance to the recognition of these stigmata in the bodies of those whose deaths, apart from status lymphaticus, would in more pious, but not more superstitious, days, have been attributed to the visitation of God". This is one side of the problem. The other relates to an associated adrenal-thyroid imbalance which Kemp (1937) suggests may accompany the status and could cause functional collapse, possibly death. Millar and Rose (1942) have drawn attention to vascular hypoplasia in the status and this has been recognized as true. Campbell reconciles both views by suggesting that there may in these subjects exist "a condition of such lowered resistance and hyper-susceptibility that the patient so affected is in danger of sudden death from trivial causes". What must remain vital is that some trivial cause does operate in the causation of death. Bad autopsy technique or sheer ignorance of some of the more trivial causes of death, like vagal inhibition, allergy, air and fat embolism, are likely to result in the pathologist failing to establish a cause of death and being encouraged to attribute it to status lymphaticus. He might equally well attribute it to dwarf stature, obesity or flat feet. I do not think recognition of this status in life has much significance for these reasons. It would be inconceivable that a surgeon or anaesthetist might be more careful than he is with the average subject, for he has a duty to provide the best care he can relative to his station as an expert; there should be no question of degrees of care.

KEITH SIMPSON, M.D.

### *Hormone Therapy in Non-infective Mastitis*

QUERY.—Is "hormonal" therapy of any value in the non-infective mastitis of young, often single, women? If not, what is the natural course of this infection and can it be halted by short-wave therapy?

REPLY.—It is, I think, the general experience that the type of non-infective mastitis of young, often single, women does frequently improve, at any rate symptomatically, after the administration of androgens, and I have found 10 to 15 mgm. of methyl testosterone daily, for courses of two months, to give satisfactory results in some of my cases. This dose is most unlikely to produce any masculinizing effects, although I always take the precaution of allowing at least a month's interval between two courses. So far as I know the nodularity of the breast tissue does not tend to disappear spontaneously, although frequently there is a longer remission of symptoms after the treatment. At the Mastitis Clinic we have not been impressed with the value of short-wave therapy in these cases.

P. M. F. BISHOP, D.M.

### *The Technique of Circumcision*

QUERY.—Can you assist me in solving the following technical difficulty in the simple operation of circumcision in babies? I have been adopting the method with the bone-cutting forceps as outlined in Pye's "Surgical Handicraft". The prepuce is freed and retracted fully, drawn forward again and the forceps placed across the skin at the level of the meatal orifice. The redundant tissue is removed and the edges of skin and mucosa gently broken down and then drawn over the dorsum of the penis so that the glans is fully visible. A dressing of plastic skin is applied, one "mattress" suture in the frenular region causing complete haemostasis. As soon as the dressing is removed after four to five days, or earlier if it should fall off, healing does not occur in the correct manner in many of my cases. The foreskin comes forward, granulation tissue begins to form at the line of union of skin and mucosa for a variable degree around the circumference, and stenosis supervenes. I try to obviate this by pushing the foreskin back each day before dressing the site. The foreskin, however, keeps coming forward and the end-result is perhaps worse than the original phimosis—a very

delivery. In addition to total white blood cell counts, Schilling hæmograms were made in each case in order to determine whether or not there was a "shift to the left" as indicated by an increased proportion of immature cells. In 8 patients in whom counts were made more than ten hours before delivery the average leucocyte count was 10,275 per c.mm. (range of 7,500 to 14,250), with an average shift to the left of 12.6 per cent. These counts were made 10½ to 237 hours prior to delivery (average 44.2 hours). In 20 patients in whom the blood was examined less than ten hours before delivery the average leucocyte count was 13,742 per c.mm. (range of 8,750 to 19,750), with an average shift to the left of 24.9 per cent. In this group the counts were made from 15 minutes to 9 hours prior to delivery (average, 3.4 hours). In 23 patients in whom the blood was examined less than ten hours after delivery (1 to 9 hours) the average leucocyte count was 17,690 per c.mm. (range of 9,750 to 34,400), with an average shift to the left of 29.7 per cent. In six patients in whom the blood was not examined until more than ten hours after delivery (11½ to 39 hours) the average leucocyte count was 12,560 per c.mm. (range of 6,800 to 21,300), with an average shift to the left of 18.0 per cent. In other words, in this investigation there was a definite increase in the total white blood cell count, with a shift to the left, about ten hours before delivery, and this persisted until about ten hours after delivery. The practical significance of these findings is that care is required in the interpretation of a white cell count shortly before and after delivery.

### *Iodine in the Treatment of Monilial Infection of the Vagina*

A REPORT of the use of weak solution of iodine (*Liquor iodi mitis* B.P.) in the treatment of 50 patients with monilial infection of the vagina is given by Claire Weekes (*Medical Journal of Australia*, May 24, 1947, 34, 636). The method adopted was as follows:—After bimanual examination *per vaginam*, swabbing for cultural examination from the cervix and vagina, treatment of any cervical erosion and testing for iodine sensitivity, the vagina was well cleaned out with sodium bicarbonate solution or hydrogen peroxide solution 50 per cent.; cotton-wool swabs were placed over the anus and between the buttocks, and painting with iodine was carried out with a cotton-wool swab held firmly in a swab-stick. If the patient was within a few days of menstruation, treatment was postponed until the end of the period, or an initial painting with gentian violet was given. During the course of iodine treatment the paintings

were carried out twice weekly, at intervals of three or four days. The number of paintings necessary for cure varied with the individual case, the average being three to four. Two patients were cured with one painting, three with two, thirteen with three, eleven with four, three with five, four with six, one with seven, one with eight, and ten patients received more than nine paintings without success and were then considered incurable so far as iodine treatment was concerned. Only three of the 38 patients considered as cured suffered relapse; they were cured after an average of four further paintings. Cure was assessed by disappearance of all pruritus and negative monilia cultures for at least one month after cessation of treatment. The patients claimed to have been cured are stated to have remained free of signs and symptoms for periods ranging from eight to three months.

### *Tyrothricin in the Treatment of Diphtheria Carriers*

USING a preparation of bismuth subnitrate with tyrothricin 0.5 gm. per cent., or in resistant cases 5 gm. per cent., R. Turpin *et al* (*Presse Médicale*, June 14, 1947, 55, 402) have treated a series of 32 diphtheria carriers. Whether the cases were recent or confirmed carriers the first treatment was carried out with the 0.5 gm. tyrothricin preparation:—During a period of sixty-two hours the patient's nasopharynx was insufflated with the powder one hour after each principal meal, i.e. three times in twenty-four hours: both tonsils were well pulverized, then the buccal cavity, then the nasal fossæ by the anterior route, and then the tonsils were again pulverized, about 0.10 gm. of the powder being used for each treatment. If the test for diphtheria bacteria was negative after the sixty-two hour treatment, then a lapse of seven days was allowed before verifying the result. If the test was positive the treatment was continued using the 5 gm. per cent. tyrothricin powder with the same technique. Although the stronger powder was well tolerated, the authors consider it better to obtain disinfection with the minimum of the antibiotic, if possible. In resistant cases the treatment was continued for one week: no signs of intolerance were noted. The treated series consisted of infants, children and adults: 28 of the 32 were free from diphtheria bacteria after 9 pulverizations on average (4 were free after a single insufflation, and 16 after two). All these cases were treated with the 0.5 gm. per cent. powder. Of the 4 resistant cases, 1 was proved negative after seven days with 21 insufflations with 5 gm. tyrothricin powder; in 2 the nasal focus was suppressed and the density of the bacteria reduced.

# PRACTICAL NOTES

## *Penicillin and Boils*

As a result of his experience with 50 cases treated in a U.S. Naval Hospital, J. H. Lilics, Jun. (*U.S. Naval Medical Bulletin*, July-August 1947, 47, 645), recommends the local injection of penicillin in the treatment of boils. The strength of solution used ranged from 20,000 to 100,000 units of penicillin per c.cm., but 50,000 units per c.cm. was finally decided upon for routine use. A 2 c.cm. syringe was used, fitted with a 1-inch 26-gauge needle, and it is claimed that the introduction of a needle of this size causes "very little pain". The needle was inserted subcutaneously at an angle just beyond the area of erythema. The point of the needle was then directed to the centre of the base of the boil, and 0.5 to 1 c.cm. injected, depending upon the size of the boil. This injection sometimes caused the boil to rupture. If rupture did not occur, the point of the boil was nicked aseptically with the point of a sterile hypodermic needle. A small piece of dry sterile gauze was then applied. If the boil did not show marked regression within twenty-four hours a second injection was given, but this was seldom required. Marked alleviation of pain occurred within twelve to twenty-four hours of the injection, and the average healing time for the series was four days. Little scarring resulted. In a control series of 14 cases treated by local moist heat, and incision when adequate spontaneous drainage did not occur, there was much more pain, more residual scarring, and the average healing time was eleven days.

## *✓ Penicillin Spray in the Treatment of Impetigo*

In an article dealing with the use of penicillin in dermatology, which is a résumé of a paper read at the Twenty-sixth Annual Meeting of the British Association of Dermatology and Syphilology in July 1946, F. F. Hellier (*British Journal of Dermatology and Syphilis*, July 1947, 59, 249) remarks that in his view penicillin is by far the most effective remedy for impetigo. With the use of a penicillin spray (tablet of 6000 to 10,000 units dissolved in 25 c.cm. sterile water) 191 cases out of a series of 204 were cured in an average of 8.6 days. As regards the failures (6.4 per cent.) the author states that penicillin-sensitivity tests showed that they were not all due to insensitive organisms, and the so-called "seborrhoeic state", which may be defined as undue sensitivity to pyogenic infections, is suspected as a causal factor. In such cases clinical healing was obtained by the use of a 2 per cent.

mercury paste or eau d'Alibour for forty-eight hours after stopping the penicillin treatment.

## *A New Analgesic*

A NEW analgesic, 4,4-diphenyl-6-dimethyl-amino-heptanone-3 hydrochloride (AN-148; Abbott Laboratories; not yet available in Great Britain) has been used for the relief of pain in a series of 106 patients during a four-month period by A. A. Gentling and J. S. Lundy (*Proceedings of the Staff Meetings of the Mayo Clinic*, June 25, 1947, 22, 249). The drug was given orally, subcutaneously, intramuscularly and intravenously, but as a rule the intravenous route was used in order to establish the dose required to obtain full and immediate effect in the individual case. The average intravenous dose employed was 5 mgm., which was estimated to accomplish approximately the same effect as 15 mgm. morphine sulphate by the same route: success was obtained in some cases with lower dosage. In addition to the use of the drug for the relief of pain in clinical conditions, it was employed in nine cases to relieve the pain occurring as the effect of spinal anaesthesia was wearing off at the end of surgical procedures: in each case striking relief from pain was obtained and the patients were able to tolerate the remainder of the operations without further anaesthesia. Good results are also recorded from the use of AN-148 as a pre-anaesthetic medication before local or general anaesthesia, the patients tolerating regional anaesthesia exceptionally well after administration of the drug; when general anaesthesia was employed it was noted that no more anaesthetic was required than with routine premedication. AN-148 was also used in ambulatory cases. No toxic reactions were noted, and neither nausea nor vomiting: in about one-third of the ambulatory cases some dizziness occurred after administration of the drug, but there was no interference with judgment or equilibrium. Up to the time of reporting no tendency to addiction had been noted, although in two cases exceptionally large quantities of the drug were given.

## *The Leucocyte Count in Pregnancy and Labour*

THERE is considerable divergence of opinion concerning the level of the white blood cell count during the later stages of pregnancy and during labour. The problem has been re-investigated by L. R. Cason and G. W. Phillips (*American Journal of Clinical Pathology*, June 1947, 17, 483) who report their findings in 28 women before delivery and 29 following

obstetrics. The author assumes that the reader will confine some 50 women each year and approximately 1,800 during his professional life. Disorders and complications with an incidence of less than 1 in 2,000 are omitted unless of special interest. The style is didactic. The space allotted to theoretical considerations is strictly limited, the book dealing almost exclusively with practical considerations. The advice given is sound, practicable and trustworthy. The chapter on post-partum hæmorrhage is excellent but for mention of a cold intra-uterine douche. Good brief summaries of most subjects of practical importance are included and even pieces of recondite information. But the practical bias of the book detracts from its value. It panders to the man who wants to do things but is disinterested in why he does them. It is open to question whether a practitioner who will meet only 8 to 10 cases of placenta prævia, and who may do 10 to 30 Cæsarean sections in a life-time is really competent to deal with these cases. So, too, is the wisdom of providing him with a book from which theoretical considerations have been almost expunged. Had the work been expanded into a more orthodoxly balanced textbook it could have been recommended with greater confidence. The book is so beautifully produced that these criticisms are made with regret.

*Der Blutspender.* BY H. WILLENEGGER, M.D., and R. BOITEL, M.D. Basle: Benno, Schwabe & Co., 1947. Pp. 197. Figures 48 and 38 tables. Price Sw. frs. 10.

THIS book is mainly concerned with the organization of blood donor services. There are good accounts of the development of these services in many different countries, both before and during the recent war, and there is extensive discussion of all problems pertaining to blood donation. There is also a good history of blood transfusion. The authors examine at considerable length the different motives which lead people to give blood. Before the war, donors were mainly of two kinds, namely, relations or friends of the patient, many of whom gave blood on only one special occasion, and professional donors, who gave blood regularly in accordance with a special tariff. In addition, in Britain, Holland and a few other countries, there were donors who gave their blood free of charge through Red Cross organizations. Under war conditions it was necessary to recruit very large numbers of donors to supply blood for plasma production and for storage. Blood donation has now become highly impersonal and education of the public is needed to bring home to them the way in which medical services have come to rely on supplies of stored blood and plasma,

and to put constantly before them that blood donation by healthy adults has become a social duty.

#### NEW EDITIONS

*A Textbook of Medicine*, by American Authors, edited by Russell L. Cecil, A.B., M.D., Sc.D., in its seventh edition (W. B. Saunders Company, 50s.) contains a number of new chapters and sections representing advances in medicine. Among the former are treatises on blackwater fever, the hæmoglobinurias, psychosomatic medicine, drug allergy, porphyria, acrodynia, and diphtheritic polyneuritis; among the latter, the antibiotics, thiouracil in hyperthyroidism, promin in the treatment of leprosy, the new antimalarial drugs, and the patch tuberculin test. These are but a few subjects chosen at random from an almost staggering wealth of material added to one of the most comprehensive textbooks of medicine.

*The Essentials of Materia Medica, Pharmacology and Therapeutics*, by R. H. Micks, M.D., F.R.C.P.I., in its fourth edition (J. & A. Churchill Ltd., 18s.) contains a new chapter on penicillin. A short section in this chapter is devoted to streptomycin. Among the new drugs included are thiouracil, benadryl, diodoquin, folic acid, trichlorethylene, the curare alkaloids, and the antimalarial drugs, paludrine, chloroquine and pentaquine. Changes in terminology in accordance with those proposed by the Pharmacopœial Committee have been adopted, and dosages in the new edition are given in the metric as well as the imperial system.

PENICILLIN looms large in the advances included in the third edition of *Handbook of Diagnosis and Treatment of Venereal Diseases*, by A. E. W. McLachlan, M.B., Ch.B., D.P.H. (E. & S. Livingstone Ltd., 15s.); in fact, its importance in the treatment of syphilis and gonorrhœa is the basic reason for the revision of the book so shortly after the appearance of the previous edition. Practitioners will find much helpful advice on the indications and contraindications for, and the administration of, the drug.

*Diseases of the Nervous System*, by W. Russell Brain, D.M., F.R.C.P., in its third edition (Oxford University Press, 37s. 6d.) contains a wealth of new material representing advances since the publication of the previous edition in 1940. The use of penicillin in the treatment of meningitis and neurosyphilis, electro-encephalography, electric shock therapy, herniated intervertebral disc, the costo-clavicular syndromes, and new drugs in the treatment of epilepsy are among the many new additions, and in the final chapter, which is devoted to the psychological aspects of neurology, some useful psychometric tests have been included.

## REVIEWS OF BOOKS

*Studies of the Renal Circulation.* By JOSEF TRUETA, M.D., D.Sc., and collaborators from the Nuffield Institute for Medical Research, Oxford. Oxford: Blackwell Scientific Publications, 1947. Pp. xix and 187. Figures 83. Price 25s.

THIS is an outstanding book. It describes a piece of research that is delightful in the artistry of its conception and execution, and it presents, as the result of that work, a new and satisfying conception of renal anatomy and physiology. The writers have shown that the kidney has two potential circulations, a greater and a lesser, and that the blood may, under normal conditions, pass in varying degrees through both, whereas in extreme conditions it may use one or the other of the two pathways almost exclusively. The vessels providing the pathway of the greater circulation are those associated with the cortical glomeruli; the channels of the lesser circulation are those associated with the juxta-medullary glomeruli. It is impossible in the space of a review to describe the experiments that have gone to prove this thesis or the excellence of the arteriograms, injection preparations, and other specimens that are reproduced in the book as a record of those experiments. They are entirely convincing, and they present a picture of the structure and mechanism of the intrarenal circulation that accords well with modern views on the secretion of urine, that provides a credible explanation of the reaction of the kidney to hæmorrhage crush injuries, and the action of nervous and hormonal stimuli, and that throws fresh light on the pathology of various renal diseases and of hypertension. The authors and publishers are to be congratulated on this book, not alone because it is clearly and attractively written, illustrated with admirable completeness, and beautifully produced, but because it brings something new, or at any rate rare, in medical literature, a piece of scientific work of first-rate importance presented for the benefit of the medical public as a whole rather than for the eyes of fellow research workers only. It has been said that the discoveries of the laboratory may take years to reach the bedside; for this the ignorance of the clinician and the arrogance of the scientist might be blamed equally. The practitioner has in any case more literature thrust upon him than he can read in his leisure and he is unlikely to leave his journals to delve into the files of technical publications. The research worker, on the other hand, is somewhat prone to thank God that he is not as other men are, to speak and write in his own

particular slang for the benefit of his cronies in his own subdivision of some branch of pure science, and to make no attempt to fit his contribution into the niche that may be waiting for it, or to suggest its possible application to the treatment of the sick. In this book we have a welcome precedent for the bridging of this gap: a precedent which, it is trusted, will be followed by other research workers.

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## INGUINAL HERNIA

By SIR HENEAGE OGILVIE, K.B.E., D.M., M.Ch., F.R.C.S.

*Surgeon, Guy's Hospital.*

THE inguinal canal is the track of a prehistoric explosion (fig. 1). It is, in fact, a physiological hernia, an expulsion of all the layers of the abdominal wall by the testis as it thrusts its way through. The key to rational hernia

surgery therefore lies in an examination of the mechanism whereby that physiological hernia is kept from becoming pathological, and in an attempt to retain that mechanism where possible.

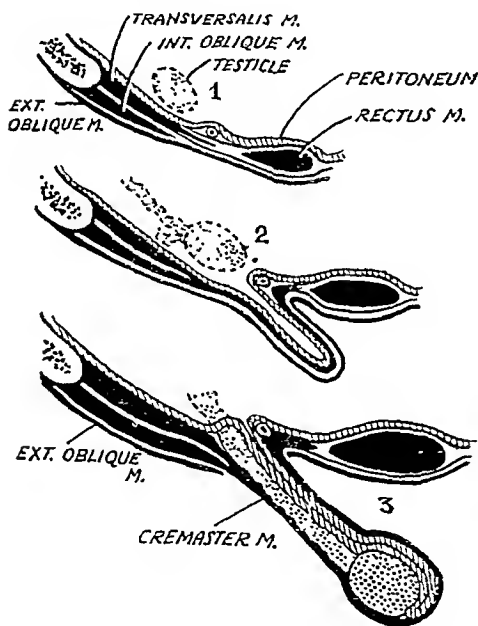


FIG. 1.—The eruption of the testis.

### SURGICAL ANATOMY

The layers which are traversed and carried on by the emerging testicle are fibrous and muscular. The first is the transversalis fascia, or fascia of Astley Cooper, for he first pointed out its significance. Elsewhere thin, this fascia becomes a tough sheet where it forms the posterior wall of the inguinal canal, and here it transmits the cord through an opening with almost

tendinous margins, the internal ring. Lytle has shown that the internal ring is not an immobile washer fixed in a fibrous sheet, but a sling suspending the cord from fan-like attachments to the posterior aspect of the transversalis muscle (fig. 2). Brandon has since confirmed Lytle's findings. The muscular layers consist of the lower edges of the internal oblique and transversalis, separate where they arise from Poupart's ligament, blended where they are inserted as the conjoint tendon into the pubis,

# NOTES AND PREPARATIONS

## NEW PREPARATIONS

**BENECOL** is an extract of mammalian intestinal mucosa designed for the treatment of rheumatoid arthritis and allied conditions. This form of treatment is based on the view that rheumatism, at least in part, is due to a lack of vital substances normally present in the intestine. Detailed particulars and literature can be obtained from the manufacturers, Benger's Ltd., Holmes Chapel, Cheshire, by whom Benecol is issued in the form of capsules, each containing 0.15 gm. mammalian intestinal extract in 0.11 gm. arachis oil.

**"CREMOSUXIDINE"** ("sulfasuxidine" succinyl sulphathiazole 10 per cent., pectin 1 per cent., kaolin 10 per cent., benzoic acid 0.3 per cent., and alcohol 5 per cent.) has been prepared for use in the treatment of infections of the intestinal tract, including bacillary dysentery, neonatal diarrhoea, ulcerative colitis, and regional ileitis. The toxicity of cremosuxidine suspension is stated to be low whilst supplying a sufficiently high level of sulphasuxidine in the blood, i.e., 1 to 1.5 mgm. per 100 c.cm., regardless of duration of treatment. Cremosuxidine suspension is supplied in bottles of 4 and 6 fluid ounces by Sharp and Dohme Ltd., West Hill Laboratories, Hoddesdon, Herts.

**DIMECOS** ("*H. ducreyi*" vaccine) is a suspension of killed Ducrey's bacilli, containing some 255,000,000 organisms per c.cm. in normal saline to which 0.1 per cent. sodium fluoride has been added. This vaccine has been prepared for use in the diagnosis and treatment of chancroid and as a pyretotherapeutic agent. A booklet, giving particulars of usage and dosage, is issued by the distributors, Pharmaceutical Specialities (May & Baker) Ltd., Dagenham, Essex. New editions of booklets on "Acigen" (mandelic acid compound), "Ascabiol" (benzyl benzoate emulsion), "Nicotinic Acid and Nicotinamide" are also available.

**HEPOVITE**, the enzyme hydrolysate of liver protein preparation (see July issue, p. 82) which is stated to have proved successful in clinical trials, is now marketed in hermetically sealed tins of 5 ounces, price 9s., by the manufacturers, Evans Medical Supplies Ltd., Speke, Liverpool.

**PHYSEPTONE** (formerly Miadone; see July issue, p. 82) is now available in tablets of 5 mgm. for oral use, in bottles of 25 and 100, price 4s. 6d. and 16s. 10d., and in ampoules for injection, 10 mgm. in 1 c.cm., in boxes of 12, price 9s. each. The prices are subject to purchase tax, but also to professional discount. The manufacturers

are Burroughs Wellcome & Co. Ltd., 12 Red Lion Square, London, W.C.1.

## THE CONSULTANTS PRIZE R.A.M.C.

A sum of money has been presented to the R.A.M.C. by Consultants to the War Office and the Armies in the Field in the late war, to found a Consultants Prize to be competed for at intervals of one to three years. The first award of £25 will be made in 1948 for an essay of not more than 10,000 words on a professional subject based on the author's own experiences between 1939-46. The prize is open to serving officers of the R.A.M.C. holding a regular or short service commission. Entries, sent through the usual channels, should reach the Hon. Secretary, R.A.M.C. Prize Funds Committee, R.A.M. College, Millbank, London, S.W.1, not later than August 1, 1948.

## NATIONAL REGISTERS OF MEDICAL AUXILIARY SERVICES

THE third edition of the "Register of Dietitians", and the sixth edition of the "Register of Chiropodists", 1947, have just been published, and copies can be obtained free on application to the Registrar, Board of Registration of Medical Auxiliaries, Tavistock House North, Tavistock Square, London, W.C.1.

## THE CARE OF CHILDREN IN THE TROPICS

A PAMPHLET, entitled "The Care of Babies and Young Children in the Tropics", by Dr. John Gibbens, has been published by the National Association of Maternity and Child Welfare Centres and for the Prevention of Infant Mortality, 5 Tavistock Place, London, W.C.1, price 1s. It deals with the prevention of infection, inoculation against disease, breast and artificial feeding, clothing, care of the skin, and other subjects important to those who have the care of young children in the tropics.

## OFFICIAL PUBLICATIONS

THE third edition of the *National (War) Formulary* comes into operation on October 1, 1947, and from that date authority to use previous editions is cancelled. The new edition is published by H.M. Stationery Office, price 6d. *Regional and Local Differences in Cancer Death Rates*, by Percy Stocks, M.D., D.P.H., is No. 1 of the "Studies on Medical and Population Subjects" issued by the General Register Office. It is published by H.M. Stationery Office, price 1s.

The contents of the November issue, which will contain a symposium on "Hernia", will be found on page lxxviii at the end of the advertisement section.

muscular rather than fibrous (fig. 5). When they are healthy, the cord with its abundant and varying blood supply can pass through undamaged, but nothing else can pass beside it.

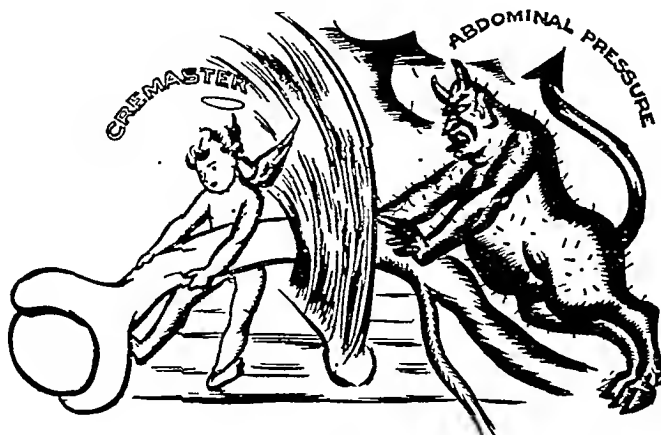


FIG. 5.

#### TYPES OF INGUINAL HERNIA

Omitting rare types, such as the congenital direct hernia with a rigid opening and long tubular sac, three types of inguinal hernia can be recognized:—the congenital, the acquired oblique and the direct (fig. 6).

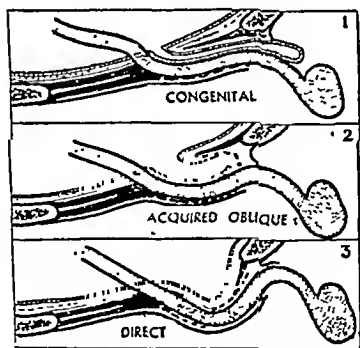


FIG. 6.—Three common types of inguinal hernia.

*Congenital inguinal hernia* is due to persistence of the funicular process of peritoneum, which precedes the descent of the testis. The sac of a congenital hernia is therefore present at birth, but there may be no hernia. If, however, the sac remains patent a hernia may enter it at any time. Clinically, congenital inguinal herniæ are usually met with either in infancy, or between the ages of twenty and thirty, when laborious occupation brings a fresh factor into play.

*The acquired oblique hernia* appears in adult life only, usually at a later period than the congenital, and often after a strain or injury. It is the most common type of hernia to follow a wrongly planned or badly performed operation for congenital hernia. Although the acquired nature of such a hernia is readily recognized at operation by the thickness, freedom, and rounded fundus of the peritoneal sac, there are no signs by which it can be diagnosed with certainty on clinical grounds.

and of the cremaster muscle which represents their extruded lower fibres and springs from the whole ring through which the testicle emerged (fig. 3), and which then wraps round the cord and extends in loops to surround the testicle itself. The most external layer, the aponeurosis of the external

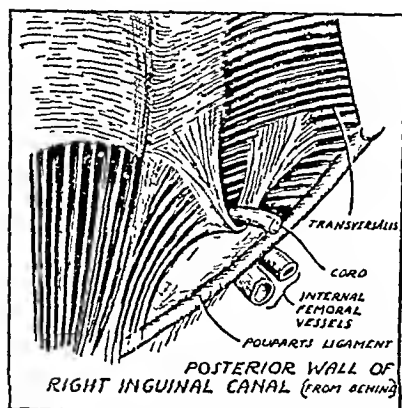


FIG. 2.—The internal ring (after Lytle).

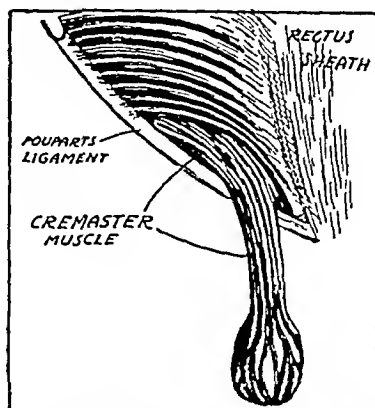


FIG. 3.—The conjoint and cremaster muscles.

oblique, is pierced by the cord near its insertion, the main fibres being thrust aside to form the pillars of the external ring, some continuing over the cord as a thin investing layer.

These muscles work with the abdominal musculature of which they form a part, and whose innervation they share. When the abdominal pressure is

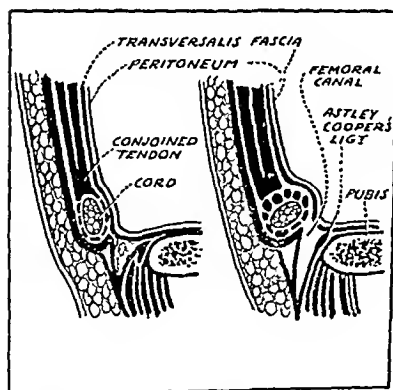


FIG. 4.—Diagrammatic section across the inguinal canal with the muscles relaxed and contracted.

raised, tending to force the cord further out of the abdomen or a pouch of peritoneum beside it, the external oblique aponeurosis becomes a rigid sheet, supporting the deeper layers and fixing the rectus sheath. The cremaster pulls the testicle and cord up against the extruding force and towards the internal ring. The conjoint muscles straighten out the arch of their lower fibres, interposing a thick muscular band to prevent the fibrous posterior from wall bulging. The transversalis muscle, as it contracts, pulls the internal ring with the enclosed cord upwards and outwards

(2) Oblique inguinal herniæ in older patients when the history is short and the inguinal canal apparently sound—95 per cent.  
(3) Old oblique herniæ and direct herniæ—90 per cent.

These three groups, with their varying prospects of cure, correspond very approximately to three degrees of pathological change, demanding in each

case an operation of a different type. In the first the inguinal canal is normal, for an unfilled hernial sac is a potential space only. In the second the internal ring has become dilated, that is, the fibrous defences have been weakened but the muscular defences are intact. In the third the posterior wall has given way and the muscles have also become weak, that is, the inguinal mechanism has failed.

In the first group *removal of the sac* will remove the only abnormality, and, provided that it has been accomplished with-

FIG. 9.—Exposure of internal oblique and cremasteric layers.

out any damage to the internal ring or the muscles, this simple operation will lead to lasting cure. Briefly the steps of the operation as I practice it are:—

The skin is first marked with three lines drawn in Bonney's blue\* at right angles to the prepared incision (fig. 7). The incision is made in the inguinal crease (Albrecht Durer's line of Venus). This incision is more than cosmetic; it avoids the coarse sebaceous glands of the pudendal region, and it lies in a plane of no tension, so that 100 per cent. first intention healing should be assured. After ligation of two or three superficial vessels the external oblique aponeurosis is exposed (fig. 8), incised down into the pillars of the ring and up as far as the muscle fibres, and reflected above and below to expose the whole muscular layer, particular care being taken to leave the cremaster undamaged (fig. 9). The cremaster is picked up between

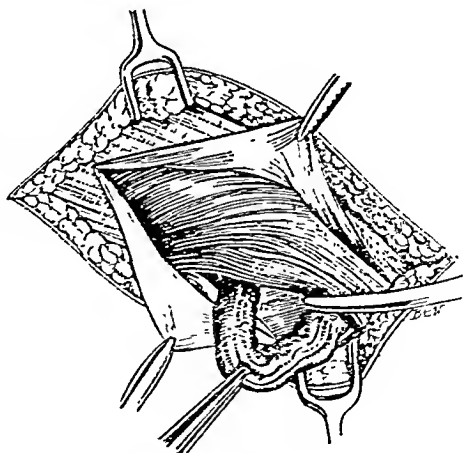


FIG. 10.—Isolation of cord.

two pairs of fine-toothed forceps, and incised in the line of its fibres, half an inch below and parallel to the ilio-inguinal nerve which lies on its surface, to open the sub-

\* *Bonney's blue*:—Crystal violet  $\frac{1}{2}$  per cent.; brilliant green  $\frac{1}{2}$  per cent.; rectified spirit and water equal parts.



*Direct hernia* is an ill-defined yielding of the posterior wall of the inguinal canal, with damage to the muscular layers preceding, accompanying, or following the fibrous yielding. Two causes are usually at work: an increase in abdominal pressure and atrophy of the muscle.

#### TREATMENT

What is the treatment of these herniæ? It is only necessary to put the question in this bald way to raise a laugh. The operations that have been advised and practised are legion. Each is somebody's darling, and no surgeon would have the tenacity to criticize or select from among them. Two statements would, however, be accepted by all.

First, that permanent cures can be obtained by operation even in large and old-standing herniæ, provided that the patient is fit enough to allow an operation appropriate to the particular defect to be done. Cure should therefore be all the more certain in the simple cases. A cure rate of 100 per cent. should be obtainable provided that an operation of the correct type has been done, and well done. It is in this last proviso that one of the chief causes of failure must be sought. The inguinal canal is the recognized practice ground for the man who likes to do a spot of surgery, just as he likes to play a spot of golf!

Secondly, in any particular group of patients submitted to similar

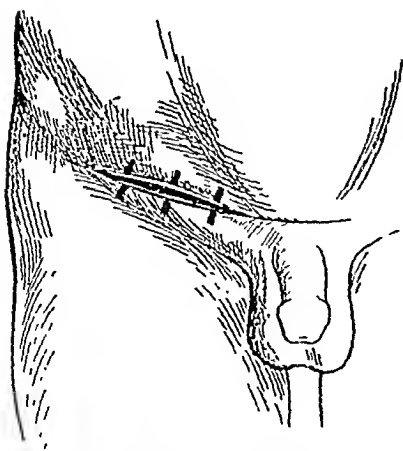


FIG. 7.—Operation for congenital inguinal hernia; the skin incision.

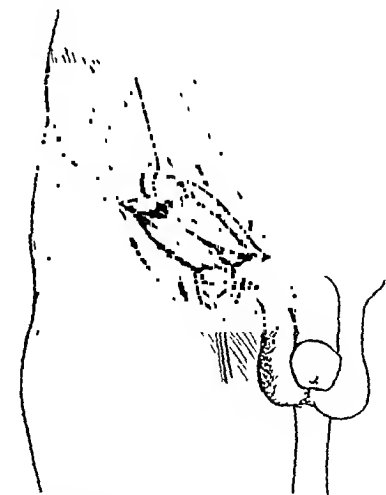


FIG. 8.—Exposure of external oblique aponeurosis.

operations, the proportion of cures varies with the type of hernia. The following may be looked upon as average or a little better than average:—

(1) *Inguinal herniæ* in childhood and oblique inguinal herniæ of recent appearance in healthy young adults—100 per cent.

stretched internal ring can be repaired leaving an inguinal canal as good as ever and as proof against recurrence. A more practical view, one to which I find myself leaning increasingly, is that inguinal canals, like eggs,

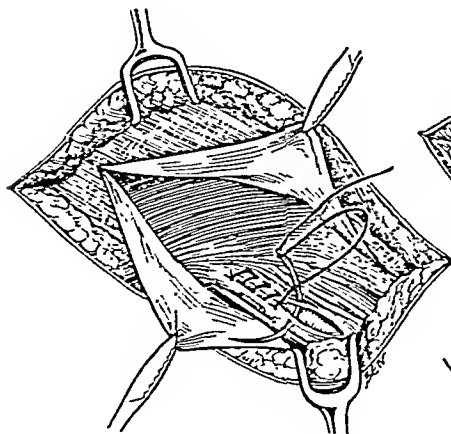


FIG. 13.—Repair of cremaster

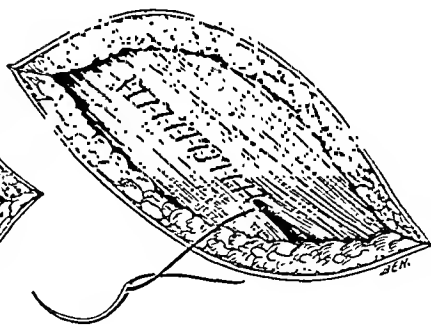


FIG. 14.—Repair of external oblique layer.

are good or bad; few are excellent in parts. The good ones should be left undamaged, the bad ones should be reconstructed, rather than repaired.

*Reconstruction operations* fall into three main categories:—(a) All structures are repaired behind the cord, which is brought out subcutaneously. Halstead's first operation was of this type (fig. 19). (b) All structures are repaired in front of the cord. The classical example of anterior repair is Halstead's second operation (fig. 20). (c) The posterior wall only is repaired behind the cord, which still lies deep to the external oblique aponeurosis (fig. 22).

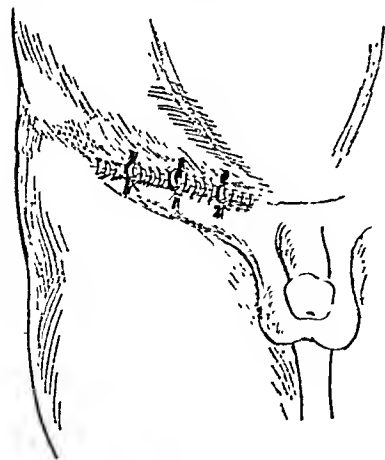


FIG. 15.—Closure of skin.

The first two groups of operation are unsound because they produce a direct channel, which, if tight enough to prevent hernia, will obstruct the vessels of the cord and, if loose enough to allow for variations in blood supply, will invite herniation.

Posterior wall reconstructions are sounder, and more successful if they are performed not as repairs but as reconstructions. They replace the work of God: a sphincter, by the work of man, a passage with firm walls running between two rigid openings placed far apart. Above all they must be strong. Bassini's operation is the basis of every good reconstruction, but Bassini

cremasteric areolar space. The cord is lifted from this space, and separated by a few strokes of the closed scissors from the cremaster and the fibrous bands behind it (fig. 10). The fascial envelope of the cord is incised with a knife, the structures of the cord are spread on the finger tips of the left hand, and the vas and vessels are slid off the peritoneal wall of the sac (fig. 11). After emptying, the sac is twisted to ensure that it remains empty, transfixed, and ligatured flush with the parietal peritoneum (fig. 12). The cremaster is carefully repaired with no. 00 catgut (fig. 13), the external oblique aponeurosis with no. 1 catgut, the external ring being reconstructed to fit the tip of the little finger (fig. 14), and the skin is closed with three interrupted tension sutures and Michel clips between (fig. 15). The clips are removed on the third day, the stitches on the fifth.

In the second group the muscle cannot be expected to maintain the integrity of the canal unless the stretched internal ring is reduced to its original size. I advocated reconstruction of the internal ring in 1936 (fig. 16). Lytle published his method of reducing the size of the ring, while retaining its mobility, in 1945 (fig. 17). I have since amplified Lytle's

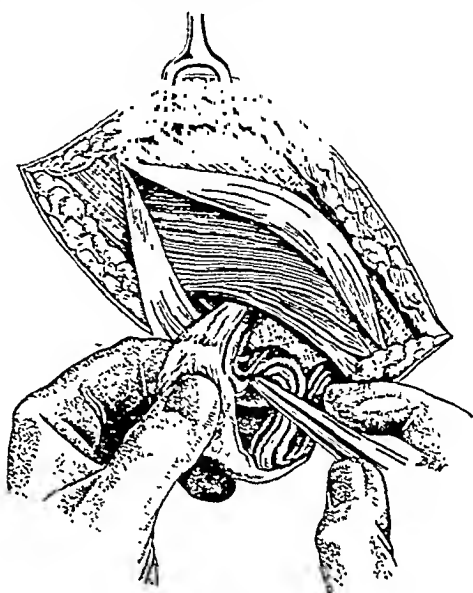


FIG. 11.—Stripping of sac.

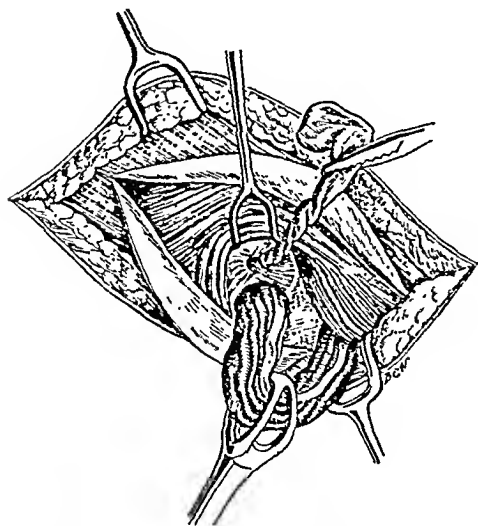


FIG. 12.—Ligature of sac.

operation by bringing down a strip of external oblique aponeurosis, attached above to the muscle fibres, and looped below round the repaired ring, so that when the muscles contract the ring is pulled up much as it is in a normal canal (fig. 18). All these operations spring from an admiration, in those who have studied it, of the inguinal canal as one of Nature's greatest masterpieces, and a wish to preserve that wonderful mechanism intact. They have the fundamental weakness of all action based on emotional rather than factual reasoning. There may be cases in which the

The imported materials in common use are wire and silk. The advantages of these materials over living tissues are that they will not yield or stretch, and the size and the strength in which they are used is chosen by

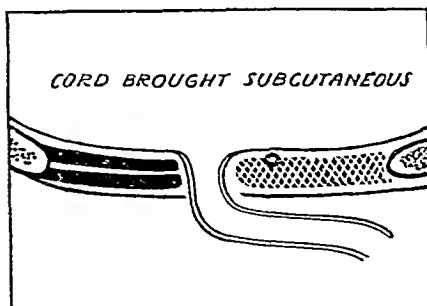


FIG. 19.—Reconstruction completely posterior.

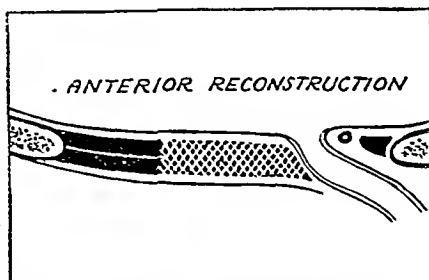


FIG. 20.—Reconstruction completely anterior.

the surgeon and not determined by what is available or what can be spared. Their disadvantages are those of all unabsorbable material, that, should infection supervene, they will give trouble until they are discharged or removed by surgery.

The wire filigree operation, introduced many years ago by McGavin and practised ever since at the Seamen's Hospital, London, by Cole and others, has a fine record of success. Sailors are found on all seas of the world plying their strenuous trade with filigrees in position. I prefer the silk lattice which is also a filigree operation, but in place of a filigree made to measure and laid in, a filigree made on the spot and woven in is used. Wire is a rigid structure laid in moving plane: silk moves without yielding and is usually innocuous.

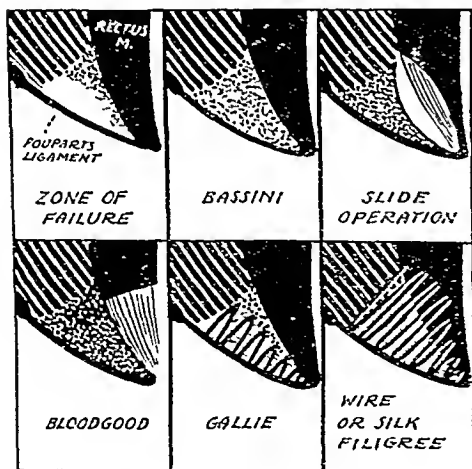


FIG. 21.—The zone of failure.

A reconstructed inguinal canal is a channel between two strong walls ending in two rigid openings. Let us examine this statement further. The zone of failure in the inguinal canal is a V with the body of the pubis as apex and Poupart's ligament and the rectus sheath as limbs (fig. 21). Between these limbs is an area that has given way, and the failure tends in time to spread upwards and outwards. A proper job of reconstruction must span the zone of failure and give secure attachment to the limbs which bound it. Bassini's operation spans nothing but makes the weak area

alone is just sabotage. Where the muscles are good, it destroys the mechanism upon which success depends. When the muscles have failed, it is inadequate, for stretched muscle never makes good fibrous tissue. It has

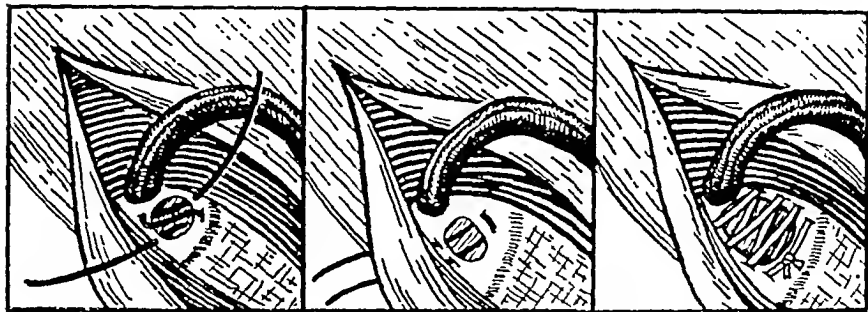


FIG. 16.—Three methods of reinforcing a stretched internal ring.

a failure record varying between 0 and 50 per cent., according to whether the follow-up is published by the operator or by someone else. To make a strong posterior wall, neighbouring structures may be swung aside, tissues may be transplanted from elsewhere in the body, or foreign materials may be imported.

Examples of the use of structures in the neighbourhood are many: the Scott slide operation improved by Tanner; the Bloodgood-Halsted rectus sheath flap; the Willys Andrews external oblique overlap; the MacArthur

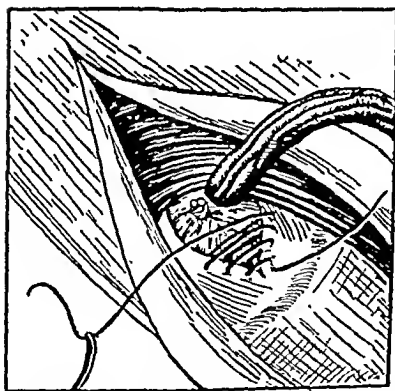


FIG. 17.—Lytle's ring reconstruction.

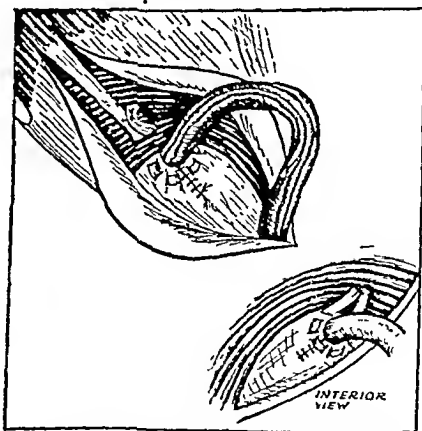


FIG. 18.—The author's method of physiological reinforcement of the internal ring.

external oblique strip darning operation. The transplanted materials used for repair are skin and fascia lata. To the first it must be objected that skin, whether on the surface or buried, will always stretch; to the second, that fascial strips are too coarse and too short for satisfactory repair.

on the pubic bone—here some large veins joining the scrotal and vesical plexuses must always be divided between ligatures. At the outer end of the inguinal canal the internal oblique and transversalis muscles are hooked up on the index finger as they arch over the internal ring, and are cut through parallel to, and half an inch above, Poupart's ligament (fig. 24); a small ascending branch of the deep circumflex iliac artery is divided and must always be ligatured. A mattress suture of stout catgut is then passed through the lips of this cut and behind the cord (fig. 25 inset), and tied while the cord is held outwards. The muscles are then sutured to Poupart's ligament behind the cord from the new internal ring to the pubic spine, much as in Bassini's

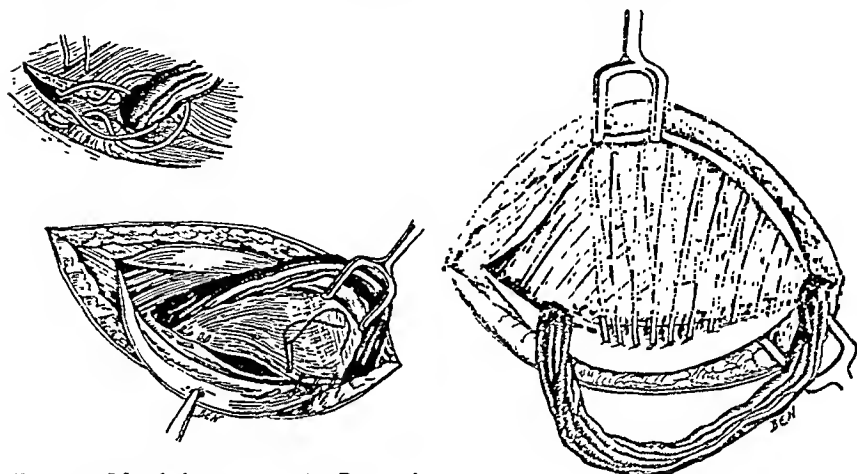


FIG. 25.—Muscle layers sutured to Poupart's ligament behind cord; inset, detail of lateralization of internal ring. FIG. 26.—Silk lattice spanning the zone of failure.

operation except that no attempt is made to displace them. Finally, the repaired posterior wall is reinforced by a continuous latticework made with no. 4 Chinese twist silk, boiled and soaked in 1:1000 solution of acriflavine. The first stitch is taken in the periosteum of the pubic bone at the insertion of the lacunar ligament, and the silk is then passed in continuous loops, lengthening as the repair passes outwards, the lower bite being in Poupart's ligament between the catgut stitches of the previous layer, the upper one in the rectus sheath as far medially as can be reached. Each loop on its downward journey is anchored by short passes through the muscle. The lattice is continued right up to the internal ring (fig. 26). Finally, the posterior wall is dusted with sulphathiazole powder, and the external oblique and skin are closed as in the former operation.

## CONCLUSION

In place of describing the structure of the inguinal canal, an attempt has been made to draw a mental picture of its function. This has been done because the treatment of inguinal hernia starts in the surgeon's mind. If he looks on this region as something with walls, a roof, and a floor, he will set out to make a better, to his own design; if he regards it as a living sentinel, he will endeavour to retain it while it remains fit for duty, and to replace it with a mechanical guard only when it has failed.

still weaker. Bloodgood's operation and the slide operations strengthen the lower part of the weak area by weakening its upper zone. The fascial strip operations, Gallie's and MacArthur's, use material too short to bridge the gap and therefore strengthen its lower half only, leaving a vulnerable area above and medial to that they repair.

Of the openings, the internal is the important one, for once a hernia has forced

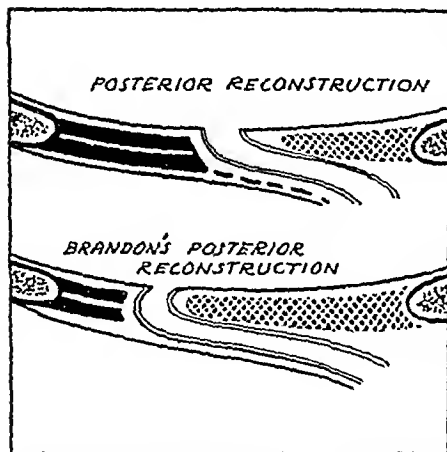


FIG. 22.—Brandon's lateralization of the internal ring.

that passage the pass is lost. Brandon, in a series of thoughtful articles, has pointed out that the internal ring is the gateway to the inguinal canal. It lies at the lower border of the transversalis muscle and well under cover of the internal oblique. When it has become stretched, suture of the internal oblique to Poupart's ligament, however carefully done, however reinforced, leaves the stretched ring still unprotected. He therefore advises that the point of emergence of the cord should be transferred from the site that has given way, to a new channel made about  $1\frac{1}{2}$  inches lateral to the old ring, where it passes through the thick and healthy origins of the muscles (fig. 22). This step, Brandon's lateralization of the ring, I believe to be the most important advance in hernia surgery of the last fifty years: like many of the advances of to-day it

was propounded by Halsted but, for some reason, abandoned later.

I believe therefore that the best form of reconstruction of a failed inguinal canal is Brandon's lateralization followed by a posterior silk lattice repair. The steps of this operation as I perform it are as follows:—

The sub-cremasteric space is opened and the cord is lifted from its bed as in the standard operation. If the posterior wall medial to the deep epigastric artery is

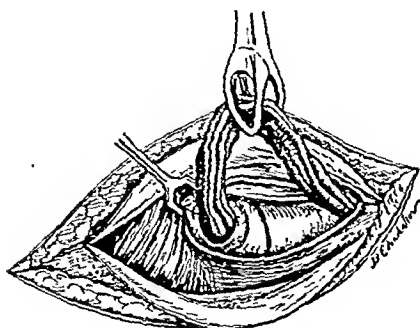


FIG. 23.—Silk reconstruction of the failed inguinal canal; exposure of the stretched internal ring.

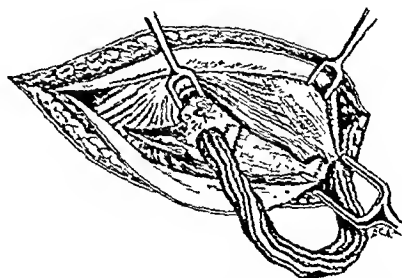


FIG. 24.—Exposure of the inner end of the canal where rectus muscle and Poupart's ligament meet. Brandon's lateralization cut.

stretched, or if the internal ring exceeds an inch in diameter, reconstruction is proceeded with (fig. 23). The cremaster is detached from the cord at its lower end to clear the apex of the failed zone, where rectus sheath and Poupart's ligament meet

the femoral canal by passing deep to Poupart's ligament. It is at this point that the important structures in relation to the sac are to be found. The sac lies medial to the compressible femoral vein, and immediately against and

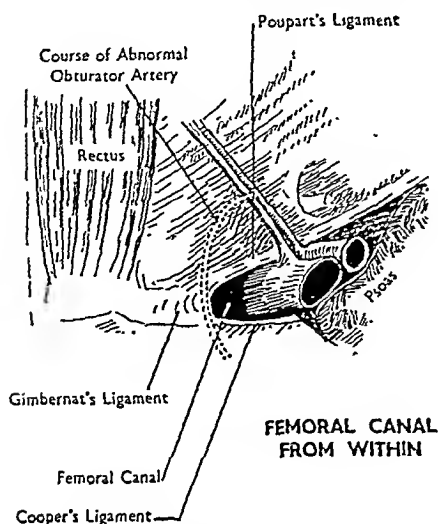


FIG. 1.—The relations of the entrance to the femoral canal viewed from within the abdomen.

the inner side of the sac. In certain cases another important relation to the sac may be an abnormal obturator artery, lying medial to the sac on the upper aspect of Gimbernat's ligament.

lateral to the outer sharp edge of Gimbernat's ligament. Posteriorly it passes over the ligament of Cooper. The sac then descends farther in the femoral canal until it is deep to the saphenous opening, when it turns anteriorly to pass through this opening. After this, if it continues to enlarge, its fundus usually does so in an upward and outward direction towards the anterior superior iliac spine.

As the neck of the sac lies against Gimbernat's ligament, it must be remembered that the bladder is lying immediately on its inner aspect, and a pouch of the bladder may even pass downwards into the femoral canal on

#### CLINICAL CONSIDERATIONS

From the diagnostic point of view, the most important thing to note is that the hernia lies below and to the outer side of the pubic spine. This is, of course, the exact opposite to the inguinal hernial sac which passes above and medial to this bony point.

The clinical fact which is of very great importance is that femoral herniæ are particularly liable to undergo *strangulation*. Strangulation is about eight to ten times more common in femoral herniæ than in inguinal herniæ. This liability to strangulation is due to the fact that the neck is the least extensible part of the sac, and it is at this point that it lies against the rigid Gimbernat's ligament. It is therefore obvious that owing to the greater liability to strangulation, the general prognosis of femoral hernia is worse than that of inguinal hernia. The following reasons peculiar to strangulated femoral herniæ render them especially dangerous:—

(1) The strangulation practically always occurs at the neck of the sac, as it is here that the sac is narrowest and most rigid. At this point the strangulated bowel is in contact with the soft femoral vein laterally, and with the rigid and sharp edge of Gimbernat's ligament medially. There is there-



# SOME VIEWS ON FEMORAL HERNIA AND ITS TREATMENT

By A. B. BIRT, M.B., F.R.C.S.

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It might be thought that the etiology and treatment of such a common condition as a femoral hernia would by now have been completely agreed upon, but this is not so. An attempt will therefore be made in this article to throw some light on controversial points.

## ETIOLOGY

There has been a considerable amount of controversy as to whether femoral hernial sacs are always acquired or if they can be of a congenital nature. Evidence in favour of the theory that the sac can be congenital was largely based on the findings at post-mortem examinations on 200 unselected subjects, all of whom were known to have had no signs of the presence of a femoral hernia in life (Murray, 1910). In this series, femoral hernial sacs were found in 52 of the subjects, 14 of them having bilateral sacs. On the other hand, femoral hernial sacs could not be demonstrated at all in a large number of post-mortem examinations carried out in infants (Keith, 1923-24).

The most reliable evidence is probably obtained by consideration of the age incidence for the occurrence of femoral herniæ. Here all evidence shows that in complete contrast to indirect inguinal hernia, which is undoubtedly commonly congenital, it is comparatively rare for a femoral hernia to occur early in life. Femoral hernia is primarily a disease of adult life, its greatest incidence being between the ages of twenty-five and fifty years in women and between thirty-five and fifty-five in men. This difference in the age incidence in the sexes is probably due to pregnancy and childbirth, both of which frequently appear to be the direct precipitating cause in women. At the same time it must be remembered that these herniæ do occur in children; Shepler and Smith (1940), report a femoral hernia in an infant aged two months. The bulk of evidence therefore points to the fact that femoral herniæ are usually acquired, but at the same time, there appears to be definite evidence that the hernia can on rare occasions be congenital in origin.

## SURGICAL ANATOMY

Before considering the clinical aspects and treatment of femoral herniæ, it is necessary to note the anatomical structures which have a bearing on the condition and its treatment (fig. 1).

The femoral hernial sac passes down behind the inguinal canal and enters

difficulty, but its absence from the same side of the scrotum will point to its true diagnosis.

*Lipomas* and other *tumours* may arise in the region of the femoral canal and so cause difficulty in diagnosis, but careful examination will usually reveal their true nature.

#### TREATMENT

The treatment of a femoral hernia consists either in operation or the fitting and wearing of a truss.

*Trusses* are not at all satisfactory in the treatment of femoral herniæ. The anatomical arrangements of a femoral hernia prevent even a properly fitting truss from being really efficient. The pressure of the pad will only keep the fundus of the sac empty. The abdominal contents can still descend into the neck of the sac even while the truss is being worn, as Poupart's ligament prevents adequate pressure from being applied to this part of the sac. As has been pointed out above, femoral herniæ are especially liable to strangulation, and it therefore follows that a patient who is being treated by means of a truss continually runs the very considerable risk of this occurrence. For these reasons femoral herniæ are especially suited to surgical treatment, and patients suffering from the condition should be urged to have their herniæ operated upon, rather than have them treated by a method which at the best is only partially efficient, and is attended by considerable and continuous risks.

*Surgical intervention.*—A large variety of operations have been described for the cure of femoral hernia.

The early operations all aimed at the exposure of the hernial sac from below Poupart's ligament. Langenbeck, in 1888, advised simple ligature and excision of the hernial sac from below Poupart's ligament without any form of closure of the femoral canal. Parry (1901) pointed out that since the hernia was commonly acquired, mere excision of the sac without any form of closure of the canal was insufficient, in contradistinction to those which are congenital in origin, such as inguinal herniæ. The closure of the femoral canal from below by suturing Poupart's ligament to the ligament of Cooper was therefore advocated. Roux closed the femoral canal by passing a metal staple over Poupart's ligament and driving it into the ascending ramus of the pubic bone.

It was later suggested that the results of operative treatment would be improved if the hernial sac could be dealt with and the canal closed at as high a level as possible. It was on these lines that Annandale, in 1877, performed the ligature and excision of the hernial sac above Poupart's ligament, exposing the neck of the sac through the inguinal canal. Annandale did not perform any form of closure of the femoral canal, and it was left to Lotheissen to describe the closure of the femoral canal from above Poupart's ligament by suturing the lower edge of the conjoined tendon to Cooper's ligament. This he described in 1898. Many surgeons have advocated modi-

fore uneven pressure on the strangulated bowel and gangrene occurs fairly early at the part in contact with Gimbernat's ligament, so that it is here that rupture of the bowel is most likely to occur, especially if pressure is applied by taxis or by an unskilled operator.

(2) Femoral herniæ frequently do not make their presence known until strangulation actually takes place, often on their first appearance. Thus in a series of 111 cases of strangulated hernia, no less than 43 per cent. had become strangulated at, or very shortly after, their first appearance (Fergusson, 1937).

(3) The sac of a femoral hernia is often so small that the strangulation is frequently of the "Richter's" type, involving only part of the circumference of the bowel, so that obstructive signs and symptoms do not occur and diagnosis is therefore all the more difficult. The presence of a strangulated femoral hernia will be overlooked sooner or later, unless it is always suspected and all hernial sites examined as a routine.

(4) Femoral herniæ especially tend to occur, and therefore to strangulate, in old and debilitated persons, in whom the risks are obviously all the greater.

It should be noted that a femoral hernial sac is usually embedded in a fair amount of extraperitoneal fat, and for this reason the sac is often much smaller than it is thought to be. It is this fat which frequently makes the hernia appear to be irreducible, when in fact the contents of the sac have actually been reduced.

#### DIAGNOSIS

The main conditions to be borne in mind from the point of view of differential diagnosis are:—

*Inguinal hernia.*—This diagnosis depends upon the appreciation of the relationship of the hernial sac to the pubic spine. A femoral hernia is below and lateral, whereas an inguinal hernia is above and medial to this bony point.

*Psoas abscess.*—In this case there are clinical and radiological signs of spinal disease, and cross-fluctuation can often be obtained with a palpable mass in the iliac fossa.

*Inguinal adenitis.*—This condition will not be confused with a reducible femoral hernia, but it can easily be mistaken for strangulation of a piece of omentum in a femoral hernial sac, both conditions giving rise to the presence of a tender irreducible lump in the same situation. The diagnosis of adenitis can usually be arrived at by the careful search for, and the finding of, a primary focus of infection in the area drained by these glands. It will also often be found that several of the inguinal glands are enlarged.

*Saphena varix.*—This swelling has a cough impulse like a femoral hernia, but the feeling of a fluid thrill can also be appreciated. It will also be observed that in the case of a varix the swelling fills up from below.

An *ectopic testicle* lying in the region of the femoral canal may cause some

ligament is then displaced upwards, and the neck of the femoral hernial sac is dissected out by dividing the transversalis fascia below the conjoined tendon. The contents of the hernia are reduced within the abdomen, and the neck of the sac is ligatured at this point. The entrance to the femoral canal is then obliterated by one of three methods: either by suturing the conjoined tendon to Cooper's ligament, as described by Lotheissen, or by suturing the upper cut edge of the external oblique to Cooper's ligament, as described by Battle, or by suturing Poupart's ligament to Cooper's ligament, as in the operation from below, but in this case doing it from the upper aspect of Poupart's ligament (fig. 3).

#### THE CHOICE OF OPERATIVE PROCEDURE

There is considerable controversy as to which type of operation gives the most satisfactory results. The answer to this can only be arrived at by observing the results of treatment in a large number of cases.

The immediate operative mortality for any of the operations is low in the case of non-strangulated herniæ, but it appears to be about 5 per cent. for all cases of strangulated hernia. The recurrence rate after operations for femoral hernia varies from 5 per cent. to about 10 per cent. in different reported series of cases.

Fergusson (1937) followed up the results of the operative treatment of 185 herniæ (reducible, irreducible and strangulated) treated by excision of the sac and repair by the femoral route and found a recurrence rate of 7.8 per cent., whereas he found that in 284 herniæ (reducible, irreducible and strangulated) treated by excision of the sac and repair by the inguinal route there was a recurrence rate of 9.1 per cent. About 90 per cent. of these recurrences occurred within two years of the operation.

These figures therefore appear to be evidence in favour of the operation by *the femoral route*, and the evidence in favour of this route is increased if cases of reducible hernia only are considered.

In reducible herniæ only, Fergusson found a recurrence rate of 6.3 per cent. in 80 herniæ operated upon by the femoral route, and a recurrence rate of 9.2 per cent. in 141 herniæ operated upon using the inguinal route.

Fergusson also noted the occurrence of inguinal hernia following the operative cure of femoral herniæ. His cases showed a marked increase in the appearance of inguinal hernia following operations using the inguinal route, as compared with the appearance of inguinal hernia following operations using the femoral route. It would seem that the opening of the inguinal canal and the use of the conjoined tendon to obliterate the entrance to the femoral canal interfere with the mechanism of the plastic sphincter of the inguinal canal and so allow the formation of an inguinal hernia.

*The inguinal route* has definite advantages when operating on strangulated femoral herniæ. First, the constriction at the neck of the sac can be overcome by incising Gimbernat's ligament in a medial direction under direct vision, a manœuvre which has to be done blindly when using the femoral route. Secondly, should there be an abnormal obturator artery this can be seen lying on the upper surface of Gimbernat's ligament when using the inguinal approach, and the artery can therefore either be ligatured or displaced before incising the ligament. It cannot be seen when operating from below

fied methods of closure of the femoral canal, notably Battle (1901), who used the upper cut edge of the external oblique aponeurosis to form a shutter across the entrance to the femoral canal, by suturing its edge to Cooper's ligament.

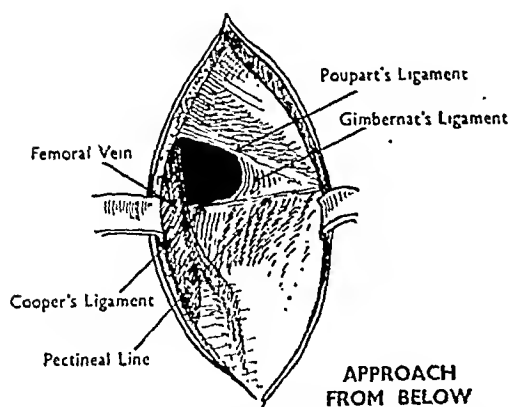


FIG. 2.—The femoral canal as seen at operation using the femoral route from below Poupart's ligament.

route from above Poupart's ligament. Different surgeons use various different suture materials and have their own slight modifications of these operations, but the fundamentals of the two methods remain the same.

In the case of the *femoral route*, the fundus of the sac is dissected out in the upper part of Scarpa's triangle. The dissection is continued until its neck is seen disappearing from view under Poupart's ligament. The contents of the hernial sac are reduced within the abdomen. The sac is then pulled down strongly and ligatured as close below Poupart's ligament as possible, so that when the redundant portion is excised, the part of the neck where the ligature has been placed retracts back under Poupart's ligament so that it lies well above the ligament. In ligaturing the sac, care must be taken to ensure that the bladder has not been pulled down on the inner aspect of the sac. Following this the femoral canal is obliterated by suturing Poupart's ligament to Cooper's ligament and to the fascia overlying the pectineus muscle (fig. 2).

In performing the operation by means of the *inguinal route*, the inguinal canal is opened by incising the external oblique aponeurosis parallel to Poupart's ligament, exactly as in the operation for inguinal hernia. The spermatic cord or the round

Many modifications of these operations have since been suggested, including the use of fascial grafts from the fascia lata, with which to close the femoral canal either from above or from below.

At the present time the operative cure of femoral hernia is carried out by two main methods, by the femoral route from below Poupart's ligament, or by the inguinal

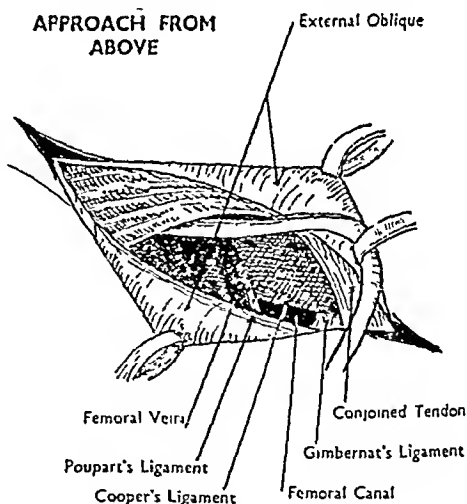


FIG. 3.—The femoral canal as seen at operation using the inguinal route from above Poupart's ligament.

# VENTRAL HERNIA

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IN no other condition is that overworked phrase "prevention is better than cure" more apposite than in ventral hernia. Ventral hernia differs from all other types of rupture (if the comparatively few cases of divarication of the rectus muscle be excepted) in that it owes its origin to the surgeon. It is owing to this origin that the term ventral hernia has been largely superseded in late years, being replaced by the term incisional hernia, which at least has the merit of according to it a correct etiology.

The surgeon may be called to open the abdomen for many diverse conditions. In most cases its closure is a matter of routine and the resulting scar neat in appearance and minimal in disability. All reputable surgeons, when the choice rests with them, plan their incisions with a view to adequate exposure and a minimum of post-operative trauma. When possible the incision is made in the line of a skin fold, parallel to cutaneous and muscular nerves and with separation rather than the division of muscular fibres. Such an ideal entry to the abdomen is by no means always possible, but the prudent surgeon takes heed of these ideals lest he be called to account at a later date for a violent and unworthy trespass: for in this trespass the patient will have little difficulty in demonstrating, if not proving, damage. In other cases the finer technique and arts of the surgeon must be sacrificed to the more urgent necessity of saving a life or at least making it more comfortable. An abscess must be drained or a portal of exit for urine provided. The introduction of a drainage tube will leave a relatively large gap in the tissues of the abdominal wall which may be inadequately closed later on by the deposit of fibrous tissue. Here is the origin of an incisional hernia that the most efficient surgeon cannot entirely prevent. He may minimize, but he cannot exorcize.

## CAUSAL FACTORS

If clumsy and inefficient surgery be excepted, incisional hernia is due to the following causes:—

(1) *The presence of a rubber drain at the original operation, e.g. appendix abscess or suprapubic cystotomy.*

(2) *Damage to a nerve or nerves.* This division of the lines of communication to a muscle is perhaps best exemplified by the Battle incision for appendicitis, improperly extended be it said, with the division of the 10th or 11th thoracic nerve before it enters the rectus muscle.

(3) *Transverse division of muscle fibre.* On *a priori* grounds this would be expected to be the most common cause of incisional hernia, yet it is comparatively rare. Kocher's subcostal incision, transverse division of the rectus muscle, "muscle cutting" operation for appendicitis, although

and is therefore cut blindly on incising Gimbernat's ligament. Thirdly, if the bowel is found to be gangrenous and a resection is therefore necessary, this can be done very easily through the same incision in the inguinal approach by simply enlarging the opening in the peritoneum. It is usually impossible to perform a resection through the femoral approach and a separate laparotomy incision has therefore to be made, with its attendant lengthening of the operation and raising of the mortality.

In some cases of strangulated femoral hernia, the strangulation may be so tight that it is impossible to incise Gimbernat's ligament in order to release the strangulation without producing damage to the strangulated bowel. In these cases it may be found necessary to divide Poupart's ligament in order to overcome the strangulation. This procedure should be avoided if it is at all possible, as it tends to leave a weakness of the whole inguinal regional. On the other hand, it is better to divide Poupart's ligament than to burst a loop of strangulated bowel. If division of the ligament has to be undertaken, it should be divided obliquely and re-sutured accurately. Oblique division of Poupart's ligament leaves raw areas of the ligament, as large as possible, in contact with each other once the suturing has been done, and therefore allows stronger and sounder healing of the ligament to occur than if it had been divided transversely.

#### SUMMARY

The etiology of femoral hernia has been discussed. The hernia would usually appear to be acquired.

The important points in the surgical anatomy have been enumerated.

The dangers of femoral hernia and its special liability to strangulation have been stressed.

The various methods of treatment have been discussed. It is suggested that the operation using the femoral route is the operation of choice in non-strangulated cases, whereas in strangulated cases the inguinal route would seem to be the better approach.

I am indebted to Mr. A. P. Bentall, M.R.C.O.G., for the diagrams appearing in this article.

#### References

- Annandale, T. (1887): *Brit. med. J.*, i, 815.  
 Battle, W. H. (1901): *Lancet*, i, 302.  
 Fergusson, J. D. (1937): *St. Thomas's Hosp. Rep.*, 2, 209.  
 Keith, A. (1923-24): *Brit. J. Surg.*, 11, 455.  
 Keynes, G. (1934): *Lancet*, ii, 1406.  
 Langenbeck, B. R. K. von (1888): "Vorlesungen über Akiurgie," Leipzig, p. 508.  
 Lotheissen, G. (1898): *Zentralb. Chir.*, 25, 548.  
 Murray, R. W. (1910): *Ann. Surg.*, 52, 668.  
 Parry, R. H. (1901): *Brit. med. J.*, ii, 1136.  
 Shepler, N. B., and Smith, C. W. (1940): *Amer. J. Surg.*, 49, 375.

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occasionally followed by incisional hernia are uncommon causes. Hideous though they appear in theory, terrifying as they look at operation, and contrary to the æsthetic sense as they must be, retribution rarely follows their perpetration, and indeed when it does so it is probably the result of nerve division rather than of muscular retraction. Furthermore, the narrow ellipse of a vertical incision has its lateral edges pulled apart by the three lateral muscles of the abdominal wall (external oblique, internal oblique and transversalis), whilst the horizontal incision has the two ends of the narrow ellipse pulled on by these same muscles with a resultant approximation of its upper and lower edges (fig. 1).

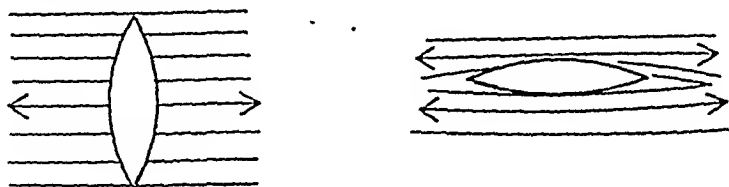


FIG. 1.—Pull of lateral muscles.

(4) *Separation of the deeper layers of the abdomen, e.g. peritoneal, muscular, and aponeurotic, after abdominal operations.* The primary cause of this is not always obvious. Indeed it is unlikely that any single cause exists. Suppuration, perhaps of a low grade and not manifest on the surface, raised intra-abdominal pressure, persistent cough, vomiting or hiccough, together with a friability of tissues often infiltrated with fat, may each and all play a prominent part in the yielding of the deep scar. Should a skin union fail also, a "burst abdomen" replaces a later ventral hernia.

(5) Two other types of ventral hernia occur which are in no way due to surgical intervention: (a) epigastric, and (b) divarication of the recti.

*Epigastric hernia.*—In this somewhat rare condition, which is almost certainly congenital, small pouches of peritoneum escape through the linea alba giving rise to tender and sometimes palpable swellings in the midline of the abdomen above the umbilicus. It should be noted that this condition has been associated with gastric or duodenal pain somewhat similar to that caused by an ulcer of these organs. Although ulcer has been found slightly more frequently than would be expected in these cases, the pain of epigastric hernia has generally been attributed to the nipping and fixation of a piece of omentum with consequent distortion of the stomach on its filling.

*Divarication of the recti* is normally associated with pregnancy, obesity, chronic bronchitis or other cause of raised intra-abdominal pressure. It is the result of the stretching of the linea alba from side to side, which for some cause has become weakened.

#### SITES

A scar hernia, be it little or great, is always inconvenient, generally tender,

and often associated with the danger of future strangulation. Owing to the nature of its inception the scar nearly always shows signs of past suppuration. It is flat, irregular, adherent to deeper tissues, and may be puckered and often discoloured. It is thin, and deep to it a definite opening can generally be felt through which abdominal contents can be protruded on coughing. These appear to be easily reducible, but at operation almost invariably omentum, large intestine, or more rarely small intestine, are found to be adherent just below the skin. Many of the patients are fat and suffer from bronchitis or diabetes. Grey Turner (1945) has said of umbilical hernia that these complications are "indications for carefully prepared treatment rather than contraindications for operation". The same aphorism applies equally well in ventral hernia. The most common sites are:—

(1) *Midline subumbilical*.—Usually the result of a previous gynaecological operation, suprapubic cystotomy or prostatectomy. It is not quite clear why gynaecological operations should be such a frequent precursor of this type of incisional hernia. They are usually clean, the incision generally easy to close without drainage, and suppuration is uncommon. It may be that the condition for which the operation had been performed was the removal of very large tumours, e.g. uterine fibroids or ovarian growths or cysts. It is well known that gynaecological tumours are the largest in the body and it is conceivable that the lower abdominal wall, and particularly the linea alba, had already been stretched far beyond its normal capacity before surgical intervention took place, with the result that after operation an external ventral hernia takes the place of a previous fibroid uterus. The moral is obvious: more attention must be directed not only to the simple closure of these wounds, but measures must be taken to return the abnormal wall to a normal condition as early as possible by exercises and external support.

In men, some of the worst types of ventral hernia follow suprapubic prostatectomy. The presence of a large drainage tube worn for days or weeks and attendant sepsis naturally predispose to a large gap into which the peritoneum and its contents are not slow to wander. It is the rule rather than the exception to find the prostatic patient of seventy years of age showing, in addition to his enlarged prostate, bilateral inguinal hernia, umbilical hernia and hæmorrhoids, due to the raised intra-abdominal pressure consequent on his straining to pass water. All these factors render ventral hernia almost a certainty in some degree. Happily the newer methods of prostatectomy (Harris, Hay, and Millin), in which primary closure of the bladder is the rule, together with the earlier age of operation, have done much, and will do more, to prevent the sequel of incisional hernia.

(2) *The outer border of the right rectus*.—This is generally associated with the drainage of an appendix abscess. When muscle fibres are held apart for a considerable time, sepsis intervenes with a resulting weak scar. In the same position a post-operative hernia may develop irrespective of sepsis or drainage if the lower abdominal nerves passing to the lateral border of the

rectus muscle are severed, e.g., in the unskilled performance of a Battle's operation for appendicectomy. Be it mentioned in this context that neither Battle nor Kammerer, who first popularized this operation, encouraged the division of these nerves. They insisted rather that the operation should take place between the 10th and 11th thoracic nerves behind the rectus muscle, at which point they are easily separable for some 2½ inches.

(3) *In the region of the gall-bladder.*—Prolonged drainage, local sepsis, and denervation of part of the rectus muscle are the precursors of hernia in this region. The suturing of the free edge of the falciform ligament to the lateral leaf of the divided peritoneum, by accident or ignorance, instead of the two cut edges, is an almost certain precursor to hernia in the paramedian position of the upper abdomen (fig. 2).

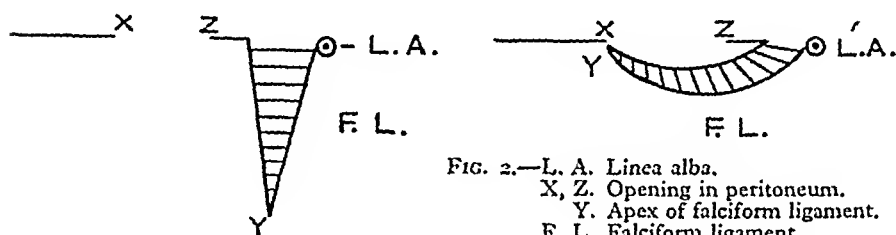


FIG. 2.—L. A. Linea alba.  
X, Z. Opening in peritoneum.  
Y. Apex of falciform ligament.  
F. L. Falciform ligament.

The remedy is obvious but occasionally impossible, as in grossly fat patients with poor or almost absent musculature, when the deep sutures persistently "cut out" and the anaesthesia is not ideal. In both this and the previous sites the chances of a scar hernia are in direct proportion to the length of time the drainage is maintained. Two weeks' drainage is followed by scar hernia in 40 per cent., three weeks in 50 per cent., four weeks in 65 per cent., and over four weeks in 80 per cent. (Abel, 1945).

(4) Non-incisional ventral herniae occur, as already mentioned, as small protrusions in the epigastric region or as a palpable gap between the two recti for the whole or part of their length—*divarication*.

#### INDICATIONS AND CONTRAINDICATIONS FOR OPERATION

Most incisional herniae call for operation. In many respects they resemble an umbilical hernia in that they occur in obese subjects, are apt to attain a considerable size and are liable to strangulation. Certain cases cry aloud for operative treatment; others are more doubtful; a few must be turned aside as unsuitable. When the hernia is comparatively small with a definite opening, the borders of which can be demonstrated by the fingers, particularly if the sac is globular and the neck narrow, operation is called for. Here the danger of strangulation is obvious. No pad or belt is likely to reduce and retain the protrusion, and if left unattended it is liable to increase in size making subsequent operation more difficult. Cases in which the predominant feature is muscular atrophy consequent on nervous damage at

previous operation, and free from a past history of sepsis, are more difficult to judge. When the weakness and disability are considerable but the muscular atrophy not great it may be possible in some cases to repair the damage by the implantation of a muscle. Very large herniæ, similar to certain types of umbilical hernia, may be inoperable by reason of the bulk of their contents, the abdomen being unable to accommodate them on their return from eventration. By and large one would advise operation unless the general condition of the patient precluded it or the bulk of the hernial contents cannot be accommodated in the abdomen.

Operation may be planned for two reasons:—(1) The patient must be prevented from a more serious catastrophe in the future, e.g. strangulation or obstruction, the more essential of the two, and (2) he must be made more comfortable. The surgeon must ask himself how far he can meet the demands of preventing a future danger and removing a present disability or inconvenience. He may profitably impose a third condition, i.e., that the patient must not be made worse.

#### TREATMENT

A detailed description is more the province of a textbook than an article such as this. Nevertheless, some indication as to the necessary treatment, the likely period of immobilization and the measures called for before return to full duty is of importance to the practitioner.

*Anæsthesia.*—When possible, local anæsthesia should be recommended. In the hands of an expert it is ideal and complete anæsthesia can be guaranteed. Space does not allow of a description of the different techniques or solutions to be employed. Its only contraindications are (1) excessive obesity (when the amount of solution necessary would be in excess of the amount held to be safe) and (2) extreme nervousness or youthfulness of the patient. It goes without saying that the local anæsthetist, generally the surgeon, must have had considerable experience of this type of anæsthesia. The surgeon will need patience and gentleness, which are always essential adjuncts to successful local anæsthesia.

*Operative procedures.*—The multiplicity of operative procedures is known to condemn any method of treatment. The treatment of ventral hernia is no exception. Its modes are legion. One surgeon will speak glowingly of a particular method, whilst another will have no success with this but will propound an alternative to which he attributes all the virtues.

Ideally, operation consists in the excision of the scar (due care being taken to avoid damage to adherent intestine), the definition of the muscular and aponeurotic layers around the opening, the excision of any narrow-necked sac or the replacement of a diffuse peritoneal bulge, and the sewing up layer by layer of the abdominal wall. Obviously many cases are not amenable to such ideal treatment. A large gap may exist over which the approximation of tissues is either impossible or only at the expense of great tension; tension

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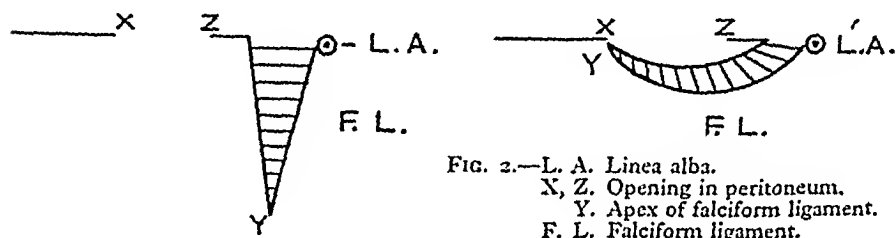


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Y. Apex of falciform ligament.  
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The remedy is obvious but occasionally impossible, as in grossly fat patients with poor or almost absent musculature, when the deep sutures persistently "cut out" and the anaesthesia is not ideal. In both this and the previous sites the chances of a scar hernia are in direct proportion to the length of time the drainage is maintained. Two weeks' drainage is followed by scar hernia in 40 per cent., three weeks in 50 per cent., four weeks in 65 per cent., and over four weeks in 80 per cent. (Abel, 1945).

(4) Non-incisional ventral herniae occur, as already mentioned, as small protrusions in the epigastric region or as a palpable gap between the two recti for the whole or part of their length—*divarication*.

#### INDICATIONS AND CONTRAINDICATIONS FOR OPERATION

Most incisional herniae call for operation. In many respects they resemble an umbilical hernia in that they occur in obese subjects, are apt to attain a considerable size and are liable to strangulation. Certain cases cry aloud for operative treatment; others are more doubtful; a few must be turned aside as unsuitable. When the hernia is comparatively small with a definite opening, the borders of which can be demonstrated by the fingers, particularly if the sac is globular and the neck narrow, operation is called for. Here the danger of strangulation is obvious. No pad or belt is likely to reduce and retain the protrusion, and if left unattended it is liable to increase in size making subsequent operation more difficult. Cases in which the predominant feature is muscular atrophy consequent on nervous damage at

previous operation, and free from a past history of sepsis, are more difficult to judge. When the weakness and disability are considerable but the muscular atrophy not great it may be possible in some cases to repair the damage by the implantation of a muscle. Very large herniæ, similar to certain types of umbilical hernia, may be inoperable by reason of the bulk of their contents, the abdomen being unable to accommodate them on their return from eventration. By and large one would advise operation unless the general condition of the patient precluded it or the bulk of the hernial contents cannot be accommodated in the abdomen.

Operation may be planned for two reasons:—(1) The patient must be prevented from a more serious catastrophe in the future, e.g. strangulation or obstruction, the more essential of the two, and (2) he must be made more comfortable. The surgeon must ask himself how far he can meet the demands of preventing a future danger and removing a present disability or inconvenience. He may profitably impose a third condition, i.e., that the patient must not be made worse.

#### TREATMENT

A detailed description is more the province of a textbook than an article such as this. Nevertheless, some indication as to the necessary treatment, the likely period of immobilization and the measures called for before return to full duty is of importance to the practitioner.

*Anæsthesia.*—When possible, local anæsthesia should be recommended. In the hands of an expert it is ideal and complete anæsthesia can be guaranteed. Space does not allow of a description of the different techniques or solutions to be employed. Its only contraindications are (1) excessive obesity (when the amount of solution necessary would be in excess of the amount held to be safe) and (2) extreme nervousness or youthfulness of the patient. It goes without saying that the local anæsthetist, generally the surgeon, must have had considerable experience of this type of anæsthesia. The surgeon will need patience and gentleness, which are always essential adjuncts to successful local anæsthesia.

*Operative procedures.*—The multiplicity of operative procedures is known to condemn any method of treatment. The treatment of ventral hernia is no exception. Its modes are legion. One surgeon will speak glowingly of a particular method, whilst another will have no success with this but will propound an alternative to which he attributes all the virtues.

Ideally, operation consists in the excision of the scar (due care being taken to avoid damage to adherent intestine), the definition of the muscular and aponeurotic layers around the opening, the excision of any narrow-necked sac or the replacement of a diffuse peritoneal bulge, and the sewing up layer by layer of the abdominal wall. Obviously many cases are not amenable to such ideal treatment. A large gap may exist over which the approximation of tissues is either impossible or only at the expense of great tension; tension

be it said being the greatest of all handicaps to the repair of hernial gaps.

When sepsis has been a marked feature of the original operation the encapsulation or encystment of micro-organisms in and around the wound must be remembered and, although it is unlikely that the cure of the hernia will be attempted earlier than a year or two after the first operation, in some cases the micro-organisms have emerged from their "pill-boxes" and "dug-outs" to re-invade the tissues after the inevitable trauma of a further operation.

When large gaps remain to be closed, the interposition of some extraneous substance may be called for. *Silver wire filigrees* had much vogue in earlier days and indeed they often functioned very well. The lacing with strips of fascia or floss silk has largely superseded them at present, albeit without any great outstanding advantage. Many of the drawbacks to the silver grid appear to me to be theoretical rather than practical, the one outstanding disadvantage being a bending of the grid. *Dermal implant* has been much vaunted. In theory it appears excellent.

An arca on the outer side of the thigh can be prepared and with a suitable skin-graft knife, e.g. Humby's, the *epidermis* can be cut and turned back on a hinge over a large area. The *derma* can then be removed, implanted in the hernial gap and the *epidermis* on the thigh returned to its original site and tacked in position by a few stitches acting as a skin-graft to the derma-less area of the thigh.

I have had more success with the use of a very thin *lamina of sorbo rubber* (specially made for me) implanted in the musculo-aponeurotic gap just superficial to the peritoneum, and stretched by a few stitches at its extremities so that the "pores" are held open for the introduction of fibroblasts. I found this method admirable until the later years of the war when failures began to occur. In every case in which they occurred sepsis was the causative agent and, though loath to blame others rather than myself, I did feel that possibly the low regenerative power of many of the patients was in some cases due to their war-time, and still worse, peace-time dietary. I still feel that this method is at least as useful as any other calling for the implantation of a foreign body. Although several grafts had to be removed, no case was made worse, and even in spite of the removal (not by any means always easy) a well-marked fibrocytic reaction had occurred and the hernia was for the most part well controlled, the sole reason for removal being a septic sinus.

No mention of treatment would be complete without referring to the method of *crossing of the rectus muscles* for large herniæ below the umbilicus. This method, admirably described by Nuttall (1937), is a formidable procedure and not to be undertaken too lightly lest in its failure the condition of the patient be made worse; but I believe it to have a real place in the treatment of low ventral hernia. Briefly, the two rectus muscles are carefully freed in their sheaths, detached from the pubic bones, crossed over and re-attached so that the right rectus becomes inserted into the left pubis and *vice versa*.

When nerve damage rather than sepsis is the primary cause of muscular atrophy the *transplantation of a muscle* and its tendon, e.g., the tensor fasciæ femoris, has been used with some success by Kenneth MacKenzie (1924), who transplanted the tensor fasciæ femoris and part of its tendon (ileo-tibial band) into the lower part of the abdominal wall. The muscle with its nerve and vascular supply, which enter it far back and high up, is swung on its origin through 90° to 100° on to the anterior abdominal wall and fixed in its appropriate position. Both these latter methods are somewhat heroic in conception and are called for only in exceptional circumstances.

#### AFTER-TREATMENT

This is largely a matter of common sense. Absolute immobility is as fatuous as unlimited freedom. When considerable repair of tissue planes has been carried out, adequate time is necessary for their healing: seventeen to twenty-one days in bed will probably be necessary. The position in bed matters little and patients may be allowed to adopt an attitude most comfortable to themselves. I like to get them out of bed to a high chair suitably cushioned after about ten days, to have their bed made, but I stipulate there shall be no walking and they shall have adequate assistance in their one step from bed to chair. *Early exercises* (after forty-eight hours) are initiated by a competent physiotherapist. These in their earliest stages take the form of raising the head and shoulders, gradually working up to sitting and, in the latest stages, raising the legs from the bed when the head and back are supine. The point of great importance is that all exercises should be gradual and no sudden strain should be permitted. Operations for hernia of all types carry with them a great liability to bronchitis and post-operative cough, even when local anæsthesia has been used. *Breathing exercises* should be started before the operation and resumed immediately after it.

In conclusion, it must be emphasized that the treatment starts before operation and continues for some weeks after it. Exercise must be continuous, progressive and gradual, each day seeing a slight increase of physical effort. The patient must be dissuaded from the all too prevalent desire for complete immobility "until I am quite healed, Doctor". He should, however, be instructed that any *sudden* strain must so far as possible be avoided, coughs and sneezes included.

#### References

- Abel, L. (1945): Grey Turner's "Modern Operative Surgery," London, Vol. II, p. 1088.  
Mackenzie, K. (1924): *Brit. J. Surg.*, 12, 28, 45.  
Nuttall, H. C. W. (1937): *Ibid.*, 25, 98, 344.  
Turner, G. Grey (1945): "Modern Operative Surgery," 3rd edition, London, Vol. II, p. 1073.



# THE HERNIA PROBLEM IN CHILDREN

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HERNIA in the child differs greatly from hernia in the adult and justifies separate consideration. The problem in the adult more concerns the selection of the most suitable technique to ensure a permanent cure, and this depends upon the anatomy of the hernia and the physique of the patient. In the child there is general agreement as to the type of operation advisable, and recurrence is, or should be, unknown; debatable points include the prospect of natural cure, the type of truss, if any, to be used, and the right time to operate.

Inguinal hernia is the most common congenital malformation in children and forms a large part of the surgical work of any children's hospital; umbilical hernia is also of considerable frequency but of less immediate importance; femoral hernia is a rarity. Strangulation of a hernia is a constant menace to the adult; true strangulation is rare in a child.

## INGUINAL HERNIA IN THE MALE

Inguinal hernia is always congenital. Its etiology and treatment are based on precise pathology and it is therefore well to recapitulate briefly its mode of formation. The processus vaginalis is the all-important structure. As the testis guided by the gubernaculum descends from its intra-abdominal position it carries with it a pouch of peritoneum. On arriving at the internal abdominal ring the testis passes down into the scrotum, invaginating this peritoneal pouch. The upper part of the processus vaginalis becomes narrowed and finally, at or soon after birth, obliterated: the lower part of the processus vaginalis invests the testis and becomes the tunica vaginalis. If the processus remains open, communicating with the abdominal cavity, a potential hernia is present. All degrees of obliteration may be found. If the processus is patent throughout, a large potential space is open to abdominal contents and "hernia magna" develops. The sac may be obliterated except for little more than a dimple at the abdominal end which may by intra-abdominal pressure develop into a hernia in later life. The processus may be closed at either end, and in the intervening space, fluid collects to form a hydrocele of the cord.

The importance of the correct descent of the testis is obvious and in every case of hernia the exact position of the testis should be determined. An imperfectly developed testis is always associated with a patent processus vaginalis: an ectopic testis sometimes. Care must be taken not to confuse a

retractile testis with an undescended testis. The cold hand of an examiner and an overactive cremaster muscle have often led to a wrong diagnosis.

#### TREATMENT

The treatment of any inguinal hernia in the child depends upon the obliteration of the processus vaginalis or sac. This may be achieved by merely assisting Nature or by operative interference. There is much evidence to show that in the first few weeks of life the natural process of fusion can continue. It has been frequently found at operation in infancy that the neck of the sac has been almost closed with firm adhesions, or a thickened constriction ring may be observed showing an attempt at natural closure. This natural cure only takes place in the first few weeks after birth, and requires for its success undisturbed apposition of surfaces, that is to say, nothing must enter the cavity from the abdomen. This should be the function of a truss.

What is the treatment to be? The most certain cure of an inguinal hernia in the child is the removal of the sac by operation, but operation cannot be recommended at every age nor in every case, and treatment by truss has definite indications.

It is fundamental that all preventable causes of straining should be corrected. Frequent crying may be due to dietetic errors and is often wrongly attributed to the hernia. Difficulty of micturition may be due to phimosis but more often it is caused by a contracted urinary meatus, either congenital or the result of recurrent ulceration with an alkaline urine. Phimosis will require circumcision. Stenosed meatus will need meatotomy. Ammoniacal irritation is cured dramatically by the administration of acid sodium phosphate. Constipation, diarrhoea or threadworms leading to rectal tenesmus must be corrected.

*Treatment by truss.*—In infants a truss should be tried. If it is efficient and prevents the entry of abdominal contents, omentum, bowel or fluid, into the sac at all times, there is every reason to hope for a permanent cure. After the first few weeks of life this is unlikely but the truss will prevent the condition from getting worse and will tide the patient over until the optimum age of operation arrives. If control is difficult and if difficulty in reduction has been encountered, operation at any age can be performed.

*Trusses:* The skein of wool has held an honourable place in many clinics for the treatment of hernia in infants. No doubt if applied with care by the physician or skilled nurse it is efficient, comfortable and clean by virtue of its easy renewal. Too often in practice it is found that its accurate application is beyond the powers of a hospital mother and it fails to keep the hernia reduced. After many trials in the past I have abandoned it as a routine measure. The best truss to use in the first six months of life is the horseshoe-shaped rubber truss with inflatable pads. It is easy to apply, covers both inguinal canals, and is efficient and simple to clean. After six months a

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rubber-covered spring truss is advisable. Two should be provided and the mother instructed never to leave the truss off, save momentarily for changing. It is essential to emphasize the need for cleanliness. Soap and water, spirit and powder to the skin will prevent excoriations.

*Treatment by operation.*—The ideal age for operation is two years. At this age the operation is easier owing to the less delicate nature of the tissues and the child is easier to nurse and keep surgically clean. Dissection, ligature and removal of the sac at its neck are all that is required. There should be no disturbance of the muscle or fascial arrangements of the inguinal canal. If, however, incarceration has occurred or if strangulation is threatened, operation can be performed at any age.

*Strangulation* of an inguinal hernia is extremely rare. Irreducibility leading to *incarceration* is relatively common. If the patient, usually an infant under six months of age, presents an irreducible hernia correct measures applied at once will probably obviate either of these developments. Taxis should not be persisted in. Posture is all-important. The infant should be placed in the Trendelenburg position with blocks under the foot of the bed or an inverted chair under the mattress. The ankles can be secured by a clove hitch of some soft material to control the position. An ice bag is applied to the hernial region, and an appropriate dose of morphine or nepenthe is administered. In a few hours the hernia will be found to be reduced. If the clinical features of obstruction persist, such as irreducibility and vomiting, operation must be undertaken. Often the hernia disappears on the table under anæsthesia.

#### HERNIA WITH IMPERFECTLY DESCENDED TESTIS

This is a constant source of difficulty. An infant presents a swelling in the inguinal region and on careful examination it is found that there is no testis in the scrotum on that side. Such a swelling often becomes tense and may cause pain, and with crying the tension increases. If the child is taken off his feet and rested, the swelling usually disappears. The hernia is apt to reappear with exertion and the mother's anxieties are repeated.

It is obvious that a truss cannot be worn, for not only would it press injuriously on the testis but it would interfere with its further descent. Operation for the hernia will demand treatment of the undescended testis also, and in infancy mobilization and fixation of the testis are unsatisfactory. The technique is difficult owing to the delicacy of the tissues, and injury to the plexus of veins, invariably followed by atrophy of the testis, is a constant risk. It is better to postpone operation for imperfectly descended testis until the child is at least eight years old. In young children a waiting policy is advisable. If the hernia descends the child should be taken off his feet until the swelling has subsided. As the child passes out of infancy the occurrence is rarer, and the testis is allowed to continue, if it will, its normal descent. At the proper age, eight to twelve years, operation can be under-

taken, the hernial sac ablated and the testis freed and placed in the scrotum. If, however, the crisis constantly recurs, and if the anxiety of possible strangulation complicates the picture, then operation must be undertaken earlier and follows the usual steps of the accepted procedure.

#### INGUINAL HERNIA IN THE FEMALE

This presents few difficulties. It is not complicated by the descent of a testis and its diagnosis and treatment are therefore more straightforward. In my experience spontaneous cure or cure under a truss régime is unlikely and the majority are better subjected to operation at the age of two years. Inguinal hernia in the adult female nearly always presents at operation a considerable sac of undoubted congenital origin. It would have been better for the patient if the condition had been recognized and treated by a simple operation in childhood. Incarceration and strangulation of the bowel are very rare in this type of hernia. Sometimes an ovary prolapses into the sac and may undergo incarceration or even infarction from pressure. Immediate measures by rest and posture may allow the organ to return undamaged, but if a tense tender swelling persists and is accompanied by vomiting, operation should not be delayed beyond a few hours. The radical cure of an inguinal hernia in the female consists in the obliteration of the sac. It is not necessary to disturb the muscles of the inguinal canal and as a rule the sac can be dissected off the round ligament without difficulty. If this proves impossible owing to the delicacy of the tissues, no harm will accrue from including the ligament in the thread ligature of the sac at its highest point.

#### FEMORAL HERNIA

This type of hernia is uncommon. Its incidence in both sexes is about equal and it is generally bilateral. There is always a well-marked sac. No complicated operation is required for its cure. It is sufficient to expose the sac below Poupart's ligament, clear it freely, and ligate the neck high up.

#### UMBILICAL HERNIA

This is usually found in the female. It may appear within a few weeks of birth or not until the assumption of the erect posture. The protrusion follows the line of the fetal vessels in the upper part of the umbilical cicatrix; it varies in extent from a slight opening which will admit the tip of the little finger to a considerable cylindrical protuberance. Its contents are frequently omentum but sometimes a knuckle of intestine. It is at times associated with divarication of the recti up to the ensiform cartilage. Any condition causing intestinal flatulence, faulty diet, rickets, or constipation aggravates it. Incarceration or strangulation of the hernia is practically unknown. There is a strong tendency to natural cure. If the rectus muscles can approximate, the fibrous ring contracts and the hernial sac becomes

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OPERATIONS for hernia, except when the condition may be complicated by strangulation and intestinal obstruction, do not present technical anæsthetic difficulties such as are encountered in thoracic or abdominal surgery. The pathology, or perhaps more exactly the abnormal anatomy present in deficiencies of the abdominal wall, does not affect in any significant way the respiratory, circulatory or metabolic processes of the patient, nor should the actual surgical intervention itself produce, at the time, measurable derangement of these vital functions. By such criteria therefore an operation for uncomplicated hernia is a relatively minor procedure which ought not to cause much physical disturbance of the patient, and for this reason may be considered to come within the scope of the general medical practitioner in so far as the administration of the anæsthetic is concerned. In this respect it is true that the giving of ether by the occasional anæsthetist, equipped with simple apparatus such as an Ogston's mask or the Oxford vapourizer, can be very satisfactory for healthy patients in the intermediate age-groups. Indeed, in such circumstances the incidence of post-anæsthetic effects will bear comparison with those following the more elaborate methods of the trained specialist. Operating time is relatively short and anæsthesia need not be in such a deep plane as to produce saturation of the tissues with ether and so cause prolonged unconsciousness afterwards. The patient, apart from the possible claustrophobic effect of having a mask put over his face at the beginning and having a lingering, perhaps nauseating odour of ether in and around him after he wakes up, is little worse off than his luxurious friend who is put to sleep in bed with an intravenous injection of thiopentone and wakes up immediately after operation also a little nauseated perhaps but with no smell to account for it because he has been given the more fashionable and refined cyclopropane.

There are, however, a number of variables or factors which may alter the category of the operation and of the patient undergoing it and therefore make necessary more specialized methods of anæsthesia. Thus, the hernia that is strangulated and perhaps causing intestinal obstruction, or the large irreducible one requiring a long and elaborate plastic repair may involve operations which are serious enough in their effects on the patient to justify expert anæsthesia. Advanced age of the patient is another equally important indication to the insufficiently experienced anæsthetist to withhold his services in favour of a specialist of the surgeon's choice. It may happen, of



shut off. This is the essence of treatment in the first few months of life. Of all the cases seen in the out-patient department of a children's hospital the vast majority undergo natural cure. Up to one year of age the adequate and regular application of strapping will cure all but the worst cases. A belt is sometimes supplied by chemists or instrument makers: if it has a projection to fit in the umbilical aperture it is positively harmful, and even if plain it acts on the wrong principle and is quite useless.

*Strapping.*—A non-irritating zinc oxide plaster is the best. It is supplied in two-inch strips, three or four in number, overlapping, from one loin to the other. It should be applied in such a way that the recti are drawn together. No pad is required. The strapping is left in position for two to three weeks before changing, and the treatment should be continued for three to four months. By this time the apposition of the recti should have allowed the fascial opening to contract and the sac to be obliterated. If cure has not been achieved, further treatment on these lines will probably be useless.

*Operation.*—If hernia is still present at the age of three years, operation should be undertaken. Natural cure is unlikely and the hernia will remain to provide problems in adolescence or later life. The operation is relatively simple. Complicated procedures with overlapping of fascia are quite unnecessary in the child. A longitudinal incision is made which just skirts the umbilical scar. The skin is reflected with the scar which is closely adherent to the sac. If the sac has a narrow connexion with the peritoneal cavity it may be possible to ligate its neck. More often the opening is a wide one and a little dissection will be needed to expose the layers of the abdominal wall. The peritoneum and the opened sheaths of the recti are sutured in turn and finally the skin with the central scar is replaced, thus preserving the normal landmark.

#### CONCLUSION

In conclusion it may be suggested that hernia in children is one of the satisfactory branches of surgery. It is a congenital defect. Its origin and anatomical variations can be explained on embryological grounds, and its treatment based on the developmental error offers a certain cure.

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OPERATIONS for hernia, except when the condition may be complicated by strangulation and intestinal obstruction, do not present technical anæsthetic difficulties such as are encountered in thoracic or abdominal surgery. The pathology, or perhaps more exactly the abnormal anatomy present in deficiencies of the abdominal wall, does not affect in any significant way the respiratory, circulatory or metabolic processes of the patient, nor should the actual surgical intervention itself produce, at the time, measurable derangement of these vital functions. By such criteria therefore an operation for uncomplicated hernia is a relatively minor procedure which ought not to cause much physical disturbance of the patient, and for this reason may be considered to come within the scope of the general medical practitioner in so far as the administration of the anæsthetic is concerned. In this respect it is true that the giving of ether by the occasional anæsthetist, equipped with simple apparatus such as an Ogston's mask or the Oxford vapourizer, can be very satisfactory for healthy patients in the intermediate age-groups. Indeed, in such circumstances the incidence of post-anæsthetic effects will bear comparison with those following the more elaborate methods of the trained specialist. Operating time is relatively short and anæsthesia need not be in such a deep plane as to produce saturation of the tissues with ether and so cause prolonged unconsciousness afterwards. The patient, apart from the possible claustrophobic effect of having a mask put over his face at the beginning and having a lingering, perhaps nauseating odour of ether in and around him after he wakes up, is little worse off than his luxurious friend who is put to sleep in bed with an intravenous injection of thiopentone and wakes up immediately after operation also a little nauseated perhaps but with no smell to account for it because he has been given the more fashionable and refined cyclopropane.

There are, however, a number of variables or factors which may alter the category of the operation and of the patient undergoing it and therefore make necessary more specialized methods of anæsthesia. Thus, the hernia that is strangulated and perhaps causing intestinal obstruction, or the large irreducible one requiring a long and elaborate plastic repair may involve operations which are serious enough in their effects on the patient to justify expert anæsthesia. Advanced age of the patient is another equally important indication to the insufficiently experienced anæsthetist to withhold his services in favour of a specialist of the surgeon's choice. It may happen, of

course, that because of geographical isolation a medical practitioner may be faced with the problem of anæsthetizing the more critical types of case to which reference has just been made; if so, it is advisable that he should contrive to acquire some experience in the reputedly better techniques or leave the job to the surgeon and some method of regional analgesia. All this may read like a polite "warning off" notice to the occasional anæsthetist. It is certainly not intended as such but it does imply that before venturing into such work he must be cognizant of certain problems associated not only with the choice and management of the anæsthetic but also with the post-operative period.

#### PULMONARY AND CIRCULATORY COMPLICATIONS

The high incidence of pulmonary complications following operations for hernia is a recognized fact and a challenge to anæsthetists, specialist and otherwise, to take stock of their methods with a view to discovering, if possible, the extent to which the anæsthetic procedure may be responsible. Even among robust *Servicemen* such complications were more numerous than might be expected and during the recent war investigations were carried out by a number of observers. Bird (1943) noted that the highest incidence of respiratory complications followed operations for hernia and that the type of anæsthetic used had little bearing on the incidence. Babbage and McLaughlin (1944) described a series of operations, most of them for hernia, in which there was an incidence of serious post-operative pulmonary complications of 3.1 per cent. These authors observed that the routine use of spinal analgesia did not lower the incidence. Lucas (1944) made an important contribution to the subject, comparing the results of several series of herniotomies in which different methods of anæsthesia and analgesia were employed. This article will be considered later. Gusterson (1945) called attention to a high incidence of chest complications, a large proportion of which showed atelectasis after operation for hernia. Holmes (1947), in an analysis of 63 cases of similar complications which occurred after 2,064 consecutive operations, embracing a wide range of general surgery, states that 10 per cent. of the herniotomies and 5.7 per cent. of the appendicectomies developed pulmonary complications. In this series there were 407 herniotomies, 311 of which were performed under regional analgesia, mainly spinal block, and 96 under nitrous oxide, oxygen and ether. The incidence of complications was definitely higher in the patients operated upon under spinal analgesia than in those who had ether. Atelectasis and acute bronchitis in about equal ratio, were, by a long way, the pathological conditions most frequently found. In the great majority of cases of atelectasis the condition developed on the same side as the operation wound.

Most of the clinical observers quoted considered that the incidence of pulmonary complications was unduly high but that so far as general anæsthesia was concerned there was little to choose between the various

agents used. Several of them also noted that the use of spinal analgesia was attended by an incidence of complications frequently higher, and certainly never lower, than that associated with other methods, the findings of earlier workers (King, 1933; Beekman and Sullivan, 1939) thus being confirmed.

Lucas (1944), in his more specifically comparative investigation, confirmed the general verdict in regard to general anæsthesia, but observed that whilst the frequency of complications varied but little with the different drugs and methods employed, their severity was greater after ether. Possibly because of war-time conditions cyclopropane and trichlorethylene were not tried out in his investigation and to some extent this restriction applied to the work of several of the other observers. Included in the six groups which Lucas contrasted there were three in which regional analgesia was employed, this being accompanied by light basal narcosis with pentothal or chloral, omnopon and scopolamine. The results in two of these groups were similar to those of his best series under general anæsthesia in which pentothal, nitrous oxide and oxygen were administered, and he formed the opinion that post-operative pulmonary hypoventilation rather than the particular anæsthetic agent used was the causative factor. Accordingly, in the last group done under regional analgesia and light basal narcosis the patients had breathing exercises before and after operation. This routine achieved a considerable reduction in complications.

Pain in the wound and restriction of muscular movement, the latter depending upon the nature of the operation performed, are likely causes of diminished pulmonary ventilation, and this in its turn is the most important etiological factor in the initiation of atelectasis. The probability that such a relationship exists is strengthened by the observations, confirmed radiologically (Lucas, 1944; Gusterson, 1945; Holmes, 1947, and others), that atelectasis is the most common pulmonary complication after herniotomy and that in the great majority of cases it occurs on the side of operation. At the same time it must be recognized that hypoventilation is frequently a feature of basal narcosis and general anæsthesia, not only during the operation but often in the post-operative period also. If there is present beforehand an acute infection of the respiratory tract or chronic bronchial congestion due to excessive smoking, plugging of bronchioles by sticky mucus may follow reduced pulmonary movement and depressed ciliary activity during anæsthesia. The anæsthetic agent may itself stimulate secretion and so augment what is already present. In most cases blockage of bronchioles will be cleared by coughing or deep breathing, but if the mucus is tenacious and respiratory depression is prolonged beyond a certain time the air or anæsthetic gases in the lobule of lung isolated by the plug will be absorbed and that area of lung will collapse. This may take place before the patient has a chance to cough the plug out; how soon, depends upon the anæsthetic used. Cyclopropane, ether, and even oxygen may be absorbed in twenty minutes, whereas air, because of the nitrogen in it, may remain for thirty-six hours. It is thus possible for areas of collapse to develop during the course

of longer operations if the lung is "wet", but the more likely time is during the first forty-eight hours of the post-operative period when the patient is struggling back to physiological normality, as many of the older debilitated patients have to do. For the spontaneous clearance of a blocked bronchiole it is necessary that there should still be in the shut-off area of lung enough air or anæsthetic gas to exert expulsive pressure on the plug when the patient coughs. If the part has become airless then the re-entry of air cannot be effected except by dissolution of the obstructing mucus or by bronchoscopic suction.

Most of the reports quoted concern Service patients in the third and fourth decades of life suffering from inguinal hernia. In civilian practice, patients in the youngest and oldest age-groups have also to be dealt with, and for a number of reasons these present more problems in the choice and management of the anæsthetic technique than do the physically stronger individuals in the intermediate groups. The range of surgery also is increased by the addition of umbilical, femoral, incisional and some less common types of hernia. In infants, pulmonary complications after herniotomy in its simplest form, namely, ligation and excision of the sac, are rare. The operation is a short one, taking some ten to fifteen minutes, the quantity of anæsthetic is minimal, the infant does not choose to remain immobile afterwards as many older patients do, and crying is naturally incompatible with hypoventilation.

Elderly subjects, on the contrary, are more liable than all others to develop complications. The oxygenating capacity of their lungs is often deficient as a result of chronic respiratory conditions, such as bronchitis, emphysema and asthma, or poor circulatory function arising from a weakened myocardium. After operation, respiratory vital capacity is reduced still further. Such patients are also prone to *thrombosis*, mainly as a result of immobilization in bed, and *pulmonary embolism* is always a danger. Indeed, fatal embolism would appear to be more frequently associated with operations for hernia than with any others. McCartney (1945), reporting with particular regard to thrombosis and embolism, the pathological findings in 4,070 post-operative deaths, states that in 128 patients who died after operations for hernia the incidence of thrombo-embolism was 24.2 per cent., and of fatal embolism, 22.6 per cent.; the latter being the highest rate recorded by him for any operative site. The incidence generally increased with age and there was no evidence of thrombo-embolism in ten patients under thirty years of age who died after herniotomy. Another observer (Barker, 1940) considers that the extent of the operation and time taken are important factors, and in this connexion has noted that the incidence of venous thrombosis and pulmonary embolism is twice as great after bilateral as after unilateral operations for hernia.

#### CHOICE OF ANÆSTHETIC PROCEDURE

In choosing a method of anæsthesia appropriate to the individual patient, or to any particular type of operation, the anæsthetist must aim at preventing

or reducing to a minimum the complications which are known to occur. To do this certain precautions are advisable. The operation, unless it is of an emergency nature, must be postponed if the patient has an acute infection of the respiratory tract. The patient ought to stop smoking so that the chronic congestion of his bronchial mucosa may subside and the copious secretions be cleared from his lungs before the day of operation. Every smoker knows this can be done in a very few days. In patients with diminished vital capacity simple breathing exercises are beneficial, more particularly in the post-operative period. Resting must not be overdone. It is advantageous, for example, that on the morning of operation the patient should have a period of mild activity, walking around a little, indulging in the usual morning cough and blow to get rid of the night's accumulated pharyngeal, nasal and bronchial secretions before settling in bed for the pre-operative sedative. These general measures are applicable whatever anæsthetic procedure is planned.

*Regional analgesia.*—Before discussing general anæsthesia reference must be made to the use of regional analgesia. Ever since 1897, when Harvey Cushing first introduced successfully the technique of local infiltration for herniotomy, many surgeons have considered regional analgesia to be superior in almost every respect to general anæsthesia for this operation. There can be little doubt that this point of view is correct. The technique when efficiently performed ensures that not only the somatic nerves to the area but also the autonomic fibres in the spermatic cord and peritoneum of the sac are blocked. This satisfies fully the requirements of the surgeon with the least possible disturbance to the patient, except possibly a psychical element which can be controlled by careful sedation given preferably, but not essentially, by the intravenous route. All sensory stimuli are blocked and muscles are sufficiently relaxed but there is no depression of respiratory or circulatory function attributable to the technique, either during or after operation. Hypoventilation, sometimes followed by atelectasis, can and does occur in patients who have had herniotomy done under regional analgesia, because voluntary restriction of breathing starts as soon as the analgesia passes off and the patient begins to experience pain. However, having no general anæsthetic to eliminate, the patient is altogether more normal physiologically and, unless the premedication or basal narcosis has had a more profound effect than was intended, he should be able as soon as the operation is over to carry out deep breathing exercises at intervals. A compromise must be effected between the adequate relief of pain and periodic exercising of the patient's lungs; a matter which will be discussed later.

Regional analgesia is applicable to all types of operation for hernia. It is definitely indicated in elderly patients, particularly when impairment of respiratory or circulatory function is present. For any patient who exhibits serious concurrent pathology in the chest or elsewhere or in whom the hernia is complicated by strangulation the method ought to be a first

choice. If this is the best method for the ill patient, it must surely be the best for the fit one. So far as the occasional anæsthetist is concerned the actual regional block will be best left to the surgeon. If the former takes charge of the accompanying sedation, however, he must keep this minimal. Morphine,  $\frac{1}{8}$  grain (11 mgm.), and atropine, 1/100 grain (0.65 mgm.), followed by small intermittent injections of thiopentone spread over the period of the operation and not exceeding a total of 0.5 gm., should suffice in most cases, provided the analgesia is complete.

*General anæsthesia.*—There are many occasions when for expediency general anæsthesia must be employed. In such circumstances it is important that the agent should be capable of quick elimination so that consciousness is recovered soon after operation. To achieve this the premedication or basal narcosis must be minimal and include atropine; the anæsthesia just deep enough to provide adequate muscular relaxation for the surgeon's requirements and to obtund the reflexes initiated by traction on fascia and on the spermatic cord; the post-operative analgesia withheld until the patient complains and then administered intravenously with controlled dosage.

In infants, safe and satisfactory anæsthesia can be accomplished by the administration of ethyl chloride followed by ether on an open mask. In the smaller hospital where the medical practitioner may have the opportunity of using simple apparatus, nitrous oxide, oxygen and ether is a suitable alternative.

For adolescents and adults, who are more resistant, the sequence of ethyl chloride and ether on an open mask or by the Oxford vaporizer may be used, but if the operation takes a long time particular care must be taken to avoid relative overdosage. This may seem uncalled for advice to the exponent of the "rag and bottle", but in actual fact the traditional safe reputation of ether encourages a certain laxity in its control. When the agents thiopentone and cyclopropane are administered the greatest attention is paid to the plane of anæsthesia because of the marked respiratory depression which they cause, but in the case of ether such warning depression does not supervene until anæsthesia is unnecessarily deep. Thus, there may be needless saturation of the patient's tissues with ether and, arising from this, commensurate repercussions in the post-operative period. By skilful control, however, of the plane of anæsthesia the administration of ether, particularly for shorter operations and in young and fit subjects, can be satisfactory and non-hazardous. In long operations the patient will benefit if ether can be eliminated, and certainly for elderly or ill patients the anæsthetist must contrive to do this.

The judicious employment of *intravenous thiopentone* is an alternative which, with experience, may come within the scope of the occasional anæsthetist. He should not attempt to maintain anæsthesia on this alone throughout the operation. A satisfactory technique that can be recommended is the combination of an induction dose of 0.5 gm. of thiopentone

and the maintenance of anæsthesia by means of nitrous oxide and oxygen blown over trichlorethylene. Such a mixture is not so liable as ether to cause increased bronchial secretions. It does not produce vasodilatation and therefore there is less bleeding to trouble the surgeon. Elimination of the anæsthetic at the end of operation is rapid so that there is no "hang-over". This technique is a simple one which is a suitable choice if a method of regional block is not feasible.

The management of the anæsthetic for cases in which strangulation and intestinal obstruction are present is somewhat critical. If the patient is vomiting it is important that he should be safeguarded against the aspiration of reflux gastro-intestinal contents. The passing of a stomach tube before induction of anæsthesia, and its retention in position throughout operation, is an essential measure and is probably adequate even without the endotracheal tube which the specialist anæsthetist would employ. With this precaution general anæsthesia may be carried out as in the simpler cases, except that extreme care must be exercised if an intravenous barbiturate is used. Dangerous, silent regurgitation, in quantity too great for the stomach tube to remove, may occur and the fluid may be inhaled or dangerous laryngeal spasm set up which may threaten the patient's life.

#### POST-OPERATIVE SEDATION

Finally, in the prevention of post-operative pulmonary complications the proper control of sedation is almost as important as correct management of the actual anæsthetic. This is a matter in which the anæsthetist must take an interest because it is an integral part of the anæsthetic procedure. Pain must be relieved and the patient must get sleep, but medullary depression has to be avoided. The usual method of keeping the patient quiet in the immediate post-operative period by subcutaneous injection of morphine is often unsatisfactory. The rate of absorption of the drug by this route varies and its effect is unpredictable. Frequently, because of apparent lack of effect, further doses are given and ultimately marked depression may occur. In contrast to this, morphine can be given intravenously in controlled dosage, adequate to relieve pain and ensure two- or three-hour periods of sleep, in between which the patient may be allowed to remain awake and active and fit to carry out breathing exercises and other physiotherapeutic measures.

#### References

- Babbage, E. D., and McLaughlin, C. W. (1944): *Surgery*, 15, 476.  
 Barker, N. W., et al. (1940): *Proc. Mayo Clin.*, 15, 769.  
 Beekman, F., and Sullivan, J. E. (1939): *Surg. Gynec. Obstet.*, 68, 1052.  
 Bird, H. M., et al. (1943): *Brit. med. J.*, i, 754.  
 Gusterson, F. R. (1945): *Lancet*, ii, 431.  
 Holmes, F. (1947) (In the press).  
 King, D. S. (1933): *Surg. Gynec. Obstet.*, 56, 43.  
 Lucas, B. G. B. (1944), *Brit. J. Surg.*, 31, 288.  
 McCartney, J. S. (1945): *Surgery*, 17, 431.



# THE USE AND ABUSE OF TRUSSES

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DURING recent years, owing to the greater operability rate of herniæ resulting from improved surgical and anæsthetic techniques, the use of the truss has rightly become much more restricted. Nevertheless, there still remains a definite field for its employment and it is important for the practitioner to have a reasonable knowledge of the appliance, how and when to prescribe it and when to discourage or even forbid its use. It is surprising how ignorant many newly-qualified practitioners are of the indications for the use of trusses, the types available, and even the correct method of prescription and measurement. Owing to the lack of interest of some doctors in the matter of trusses, patients are apt on occasion to take the law into their own hands and obtain a truss direct from the supplier, sometimes even by post, succumbing to the blandishments of the enterprising advertiser. It is not unknown for a patient to buy a discarded appliance from a friend. On several occasions I have found a patient wearing the wrong type of truss (an inguinal truss for a femoral hernia or *vice versa*); and once the truss, acquired fortuitously, had been worn upside down for some weeks! Most surgeons have seen patients wearing trusses whose scrotal swellings were hydroceles or varicoceles and who had no demonstrable hernia.

Unquestionably, the right procedure for the patient who has a hernia which may need a truss is first to consult his doctor who, after examining him, will prescribe the correct truss which the trussmaker will supply and the doctor then approve. It is obvious that the practitioner should have sufficient knowledge and experience of trusses to prescribe accurately the type required, to be able to approve it with confidence when supplied and to disapprove authoritatively if necessary, and be capable of criticism and suggestions. Inquiries among trussmakers recognized by hospitals show that they much prefer to work in collaboration with the patient's medical attendant and, in fact, rarely supply a truss without a doctor's prescription.

## THE TRUSS

In general, the best appliance is *the spring truss* in its standard form or its commoner modifications.

The elastic band type of support, which in several types is so extensively advertised, is popular owing to its comfort and easy adjustment but is only really efficient in the smaller, easily controlled herniæ, e.g. bubonocoeles. It has the disadvantages that it is often expensive and that the pressure of the pad, usually needlessly bulky, is obtained as the result of the general compression exerted on the whole circumference of the body. As the cross-section of the body is an ellipse the points of maximum pressure under the elastic band are the outside of the hips and the points of minimum pressure the centre of the body, front and back. Moreover, the pressure of the pad

is constant and does not vary with the demands made upon it. In the spring truss, the greater the thrust on the pad, the greater is the pressure exerted by it, so that increasing intra-abdominal pressure resulting from straining or coughing will bring into play the full pressure of the spring. This condition obtains in the case of a spring truss only if the steel is finely tempered. If the band is made of bendable, i.e., insufficiently tempered steel, this varying pressure is not forthcoming. A number of the cheaper spring trusses are made of such soft steel that they can be readily bent, and this property is made use of, quite wrongly, by truss fitters to ensure accurate fitting for the individual patient. Such springs have little resilience and are apt gradually to open out. In the case of a patient of unusual shape—unduly round or flat on cross-section—any necessary alterations in the curve of the spring must be made *before* it is tempered. As examples of special shapes of the spring may be mentioned one with a more marked curve round the sacral region or more sharply curved just below the anterior superior iliac spines. The requisite strength of the spring must depend upon the difficulty in controlling the hernia; for a large protrusion which can be kept reduced only by considerable pressure, the spring may have to be strengthened up to the maximum the patient can endure.

The pad also must be adapted in shape, size and degree of prominence to meet the needs of the individual case. Thus, the fat patient with a protuberant abdomen and a hernia with a wide gap will need a large pad with a marked convexity on its inner aspect. Most scrotal herniæ will need pads of the rat-tail type. Care must be taken that the pad presses on the inguinal canal at the neck of the hernia and not on the pubic spine. Such pressure, which causes pain, usually means that the truss is too large or the pad of the wrong shape. In the case of a large hernia which tends to protrude on the medial side of the pad or above its upper border, the pad may have to be suitably built up or prolonged in the required direction.

For bathing and in the tropics a celluloid-covered truss is useful.

The best truss for *inguinal hernia*—unilateral or bilateral—in *very young infants* consists of a rubber belt in which is incorporated an inverted U-shaped pad of sponge rubber. Such a "horseshoe" truss lies snugly in position and requires the minimum of skill or attention on the part of the mother. A rubber-covered spring truss can be used for older babies.

For *incisional hernia*, a well-fitting abdominal belt suitably stiffened with a pad large enough to overlap the hernial orifice on all sides is usually adequate, or a Curtis plate type of support may be fitted for an intra-umbilical protrusion, especially in thin patients.

The *umbilical truss* for adults consists of a slightly concave circular padded plate, of a size larger than the gap in the parietes, fixed to a steel spring similar to that of an inguinal truss. If it tends to slip downwards it can be held up by a shoulder strap. The most satisfactory appliance for the *umbilical hernia of infancy* is a broad rubber belt with a *flat pad* (not a projecting knob as supplied by some trussmakers) a little larger than the hernial orifice.

In my experience, it is impossible to continue the alternative method of transverse strapping over the umbilicus for any length of time without the baby's delicate skin becoming sore.

In *ordering* the truss the practitioner should inform the trussmaker of the type of truss required, whether single or double, and if single the side for which it is required, also the size of the hernia and the build of the patient. It is best to measure for an inguinal or femoral truss with the patient lying down and for an umbilical or incisional hernia with the patient standing.

To *test for the adequacy* of a truss (inguinal or femoral) the patient sits on the edge of a chair or couch with the legs abducted and is told to cough. The site of the hernia is observed carefully and if any protrusion occurs its relation to the pad is noted. If it can be afforded the patient should have a second truss in reserve so that if the one in use becomes ineffective he will not be incapacitated while awaiting a new one. It is a wise precaution for the spare truss to be worn for short periods from time to time so that it may become accommodated to the patient's body. In this way, the initial discomfort of a new truss may be minimized.

A truss should always be put on with the patient lying down and it must be impressed upon him that he must first press the rupture back completely; also he must be told to call in his doctor at once if he is at any time unable to reduce his hernia. The appliance should be removed at night unless he has a cough. It should be placed within reach so that he can put it on again before he gets out of bed in the morning. For those patients with a chronic cough who must have some support during the night, the elastic belt type of appliance may, because of its greater flexibility, increase their comfort. A patient wearing a truss whose work involves heavy lifting should be told to keep his feet together when lifting. A well-made truss will ordinarily last for two years. If it becomes worn or the spring or straps break, or if there is a gain or loss in weight it must be replaced at once.

A well-fitting truss suitably covered should produce no effect on the underlying skin except for some discoloration and alteration in texture. If, however, the truss is ill-fitting or exerts much pressure, the skin under the pad or the spring may become sore, abraded or infected, especially if excessive sweating occurs or cleanliness is not observed. When necessary, it is advisable to harden the skin by repeated application of surgical (*not* methylated) spirit. A good dusting powder applied to the skin or truss may be of help in the case of a sensitive skin. The importance of periodic review of the patient and his truss by his own doctor cannot be overstressed.

#### INDICATIONS AND CONTRAINDICATIONS

The problem should be approached from the standpoint that the truss is a palliative and not a curative agent (except in infants) and that the ideal treatment for a hernia is operation. The *disadvantages* of a truss are:—(1) A truss will not cure a hernia (except perhaps in infancy). (2) It is uncomfortable, inconvenient and very irksome to active patients, although numbers of older patients are quite happy in their truss lives. (3) It is a

recurring expense as it needs repair and renewal. (4) It may be an actual danger when inefficient or worn under conditions not suitable to its use.

The only *advantages* of a truss are:—(1) It is a means of treating a hernia when operation is impracticable or an adequate operation for cure has failed. (2) Its use avoids an operation. This doubtful advantage fortunately appeals to few patients. In fact, the difficulty at times is to persuade the patient that operation is not suitable in his particular case.

A decision as to the correct treatment in a given case may require considerable judgment and involves considerations which may conveniently be classified as follows:—(1) Conditions affecting the patient generally, i.e. build, occupation and health; (2) factors related to the type of hernia; (3) circumstances peculiar to the individual patient.

(1) *General condition and occupation of the patient.*

*Age.*—A truss is indicated in the very old and the very young. In the former, because of the risks of operative treatment; in the latter because, in infants, a hernia can be cured (at least can be caused to disappear) by the wearing of a truss continuously up to the age of one or two years.

Between infancy and old age, patients may reasonably be divided into two age-groups:—(a) From infancy to the age of forty-five years; (b) from forty-five years to old age. No *fit* patient of the first group (up to forty-five years) suffering from any type of hernia should be treated by a truss except temporarily. It is in the second age-group (forty-five years up to old age) that the difficulty arises in deciding how best to advise the patient. If it be admitted that *every* case of femoral and umbilical hernia occurring in any fit patient of any age (except the really old) should be operated on (and a case for such an opinion will be made later in this article) the problem resolves itself into that of the treatment of inguinal hernia in middle-aged and elderly men—inguinal hernia being uncommon in elderly women and curable by operation with greater certainty.

Although the results of operation in the middle-aged patient are good, there is an appreciable recurrence rate even in the best hands and a truss may be the better treatment in some cases, although operation will probably be advised for most. Over the age of sixty it is well, on the whole, to advise a truss without refusing operation to those patients of good physique and health who, for various reasons, wish for operation. It is a good plan in dealing with these elderly patients who prefer operation to persuade them to try a truss first and if this proves unsatisfactory to acquiesce in operation. Whilst surprisingly good results are sometimes obtained by radical cures even in men over seventy, it must be recognized that any operation on an elderly or old patient is by no means devoid of risk. Although operative mortality and morbidity have been considerably lowered, there remain certain complications to which these patients, even those apparently very fit for their age, are prone. Mental confusion, for example, may follow operation, which may precipitate a condition of senile dementia. Thrombosis and embolism are more common in the elderly, whilst post-operative retention of urine, a trivial complication in the young, can be serious in an old man,

and I have experience of a patient in whom an operation for radical cure of a hernia ended up with prostatectomy a few weeks later. Such possibilities as coronary thrombosis and cerebral vascular accidents in relation to surgery can be ignored, as they are almost as likely to occur apart from operation. Lastly, it must be borne in mind that mere confinement to bed may be dangerous in old people.

*The build of the patient* from the point of view of weight and condition of the abdominal musculature is of great importance in deciding on the appropriate treatment. Obesity which cannot be reduced by the usual methods is one of the strongest reasons for a truss rather than operation. The pot-bellied patient, usually, though not necessarily, a sedentary worker, who has a flabby abdominal musculature is another type only suitable for a truss, although he may not be obese.

*The occupation* of the patient has, in the case of older subjects, a definite bearing on the treatment. A patient of sedentary occupation may well be fitted with a truss, whereas in the case of a man whose work involves heavy muscular effort or getting into awkward positions, such as an engineer, boilermaker or plumber, operation may be clearly indicated. The same applies to the active older man who wishes to engage in the more strenuous forms of sport, such as hunting and tennis.

*The general health* and physique of the patient must, of course, be carefully considered and the presence of general disease contraindicating operation is one of the most common reasons for prescribing a truss. As examples may be quoted active tuberculosis, uncompensated heart disease, cancer, certain diseases of the nervous system, and mental diseases. Most sufferers from such constitutional diseases as diabetes mellitus, pernicious anæmia, kidney and cardiovascular diseases, though these are now less of a contraindication to surgical intervention than formerly, will be well advised to be content with a truss. A chronic cough which cannot be improved by treatment, whether due to chronic bronchitis, bronchiectasis or asthma is an absolute indication for a truss unless the hernia is in such a state (irreducibility or threatened strangulation) that operation is imperative.

(2) *Factors related to the type of hernia.*

In general, the type of hernia which can be most satisfactorily treated by a truss is the *inguinal*, particularly the indirect inguinal, although with a suitable pad the direct inguinal, if not too large, can be well controlled. Obviously most cases of indirect inguinal hernia will be subjected to operation, as they occur in younger patients. It is in the treatment of the small or moderate-sized direct inguinal hernia in older men of sedentary occupation that the scope of the truss is greatest. It is rare for such a hernia to be irreducible, let alone to strangulate. Its control by a truss is comparatively easy and the prospect of recurrence after operation is not negligible.

*Femoral hernia* is not a suitable type for treatment by truss for three reasons:—(a) It is difficult to keep the pad in position over the femoral ring owing to movements at the hip. (b) The femoral pad can only press on the fundus of the sac as the neck is usually too deep to be accessible. A truss

should, when possible, press on the neck of the hernial sac, e.g., on the internal ring in an oblique inguinal hernia. Although in cases of inguinal hernia the narrower the neck of the sac the easier the control by a truss, the reverse obtains in femoral herniæ. Here, the narrower the neck, the more difficult is it to reduce the hernia and to keep it reduced by the pressure of the truss pad on the fundus of the sac. (c) A femoral hernia is frequently irreducible and is particularly liable to strangulation, and this risk is greatest in the hernia with a narrow neck, which is more difficult to control by a truss than a larger protrusion with a wide neck.

In cases of *umbilical hernia* also the control by a truss is, for the most part, unsatisfactory. Although the hernia may be large, the aperture in the abdominal wall is frequently small. Moreover, the hernia is often irreducible owing to adhesions within the sac. Additional adverse factors are the usual obesity of the patient and the mobility of the abdomen at the level of the hernia, so that it is very difficult to keep the truss in position. In general, unless the condition of the patient renders operation quite unjustifiable, no case of umbilical hernia in adults should be treated by a truss.

The *incisional hernia* may or may not be easily controlled by a truss, depending upon the size of the gap in the parietes. If the gap is small in relation to the size of the sac, not only is control more difficult but the danger of strangulation is greater. In cases in which a previous operation—whatever the type of hernia—for strangulation or irreducibility has been performed under conditions in which a radical cure was not practicable or justifiable, a truss will clearly be necessary.

### (3) *Special circumstances in individual patients.*

A few patients, perfectly fit subjects, will, from marked aversion to operation, prefer a truss. In other cases operation may be temporarily inadvisable or inconvenient because of acute illness or for business or family reasons; or, owing to pressure on hospital beds, delay in admission for operation may be inevitable. In such cases, a truss should be worn temporarily.

A hernia appearing *during pregnancy* should, in the absence of special reasons for urgent operation, be treated by a truss until after the baby has been weaned.

### SUMMARY

The practitioner should *insist* on treatment by truss in infancy and old age, in all patients suffering from diseases which would render operation hazardous or vitiate the operative result, in middle-aged and elderly patients suffering from chronic cough, obesity, or flabby musculature, or in patients upon whom a necessarily incomplete operation had previously been performed. He should *allow* the middle-aged patient with a reducible hernia to wear a truss and *advise* a truss in similar circumstances in older patients. He should *forbid* the use of a truss in every case of irreducible hernia or those in which strangulation has threatened, in all cases of femoral and umbilical hernia unless operation is clearly out of the question, and in young or early middle-aged patients suffering from inguinal hernia.

and I have experience of a patient in whom an operation for radical cure of a hernia ended up with prostatectomy a few weeks later. Such possibilities as coronary thrombosis and cerebral vascular accidents in relation to surgery can be ignored, as they are almost as likely to occur apart from operation. Lastly, it must be borne in mind that mere confinement to bed may be dangerous in old people.

*The build of the patient* from the point of view of weight and condition of the abdominal musculature is of great importance in deciding on the appropriate treatment. Obesity which cannot be reduced by the usual methods is one of the strongest reasons for a truss rather than operation. The pot-bellied patient, usually, though not necessarily, a sedentary worker, who has a flabby abdominal musculature is another type only suitable for a truss, although he may not be obese.

*The occupation* of the patient has, in the case of older subjects, a definite bearing on the treatment. A patient of sedentary occupation may well be fitted with a truss, whereas in the case of a man whose work involves heavy muscular effort or getting into awkward positions, such as an engineer, boilermaker or plumber, operation may be clearly indicated. The same applies to the active older man who wishes to engage in the more strenuous forms of sport, such as hunting and tennis.

*The general health* and physique of the patient must, of course, be carefully considered and the presence of general disease contraindicating operation is one of the most common reasons for prescribing a truss. As examples may be quoted active tuberculosis, uncompensated heart disease, cancer, certain diseases of the nervous system, and mental diseases. Most sufferers from such constitutional diseases as diabetes mellitus, pernicious anæmia, kidney and cardiovascular diseases, though these are now less of a contra-indication to surgical intervention than formerly, will be well advised to be content with a truss. A chronic cough which cannot be improved by treatment, whether due to chronic bronchitis, bronchiectasis or asthma is an absolute indication for a truss unless the hernia is in such a state (irreducibility or threatened strangulation) that operation is imperative.

#### (2) *Factors related to the type of hernia.*

In general, the type of hernia which can be most satisfactorily treated by a truss is the *inguinal*, particularly the indirect inguinal, although with a suitable pad the direct inguinal, if not too large, can be well controlled. Obviously most cases of indirect inguinal hernia will be subjected to operation, as they occur in younger patients. It is in the treatment of the small or moderate-sized direct inguinal hernia in older men of sedentary occupation that the scope of the truss is greatest. It is rare for such a hernia to be irreducible, let alone to strangulate. Its control by a truss is comparatively easy and the prospect of recurrence after operation is not negligible.

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in temperatures little above freezing point with at the most a single ill-cut garment made from an animal hide has been shown by the records of many travellers.

Darwin records in the "*Voyage of H.M.S. Beagle*" how the natives of Tierra del Fuego crowded round the ship's boats at temperatures below 45° F., often in the pouring rain with the sleet falling and melting on them. Their bodies were always for the most part exposed to the weather and some were completely naked. Similarly observations have been made on Australian aborigines. Goldby, Hicks, O'Connor, and Sinclair (1938) record: "They wear no clothes and yet at night the air temperature may fall from 37° C. to but a few degrees above freezing. They sleep contentedly near fires. They bear with amazing indifference the coldness on the side away from the fires".

The first reaction of the human body to cold is to cut down heat losses from evaporation to a minimum. Sweating is almost completely eliminated, but considerable heat is still lost in warming and moistening the inspired air. Heat loss is also reduced by a widespread vasoconstriction. This is effective in controlling heat loss because it decreases the thermal conductivity of the peripheral tissues. This thermal conductivity can be measured. Conduction is low in any substance or material which is a good thermal insulator. A good thermal insulator can support a wide difference between the temperatures of the two sides. Thus the outer surface of a good arctic sleeping bag may be almost as cold as the air which surrounds it. Similarly the skin of a person who has a good peripheral vasoconstriction may be very much lower in temperature than the inner core of the body as measured by the rectal thermometer. Thermal conduction is represented by the number of calories which leave the body per square metre of body surface per degree centigrade of temperature difference between the rectum and skin. At an environmental temperature of 35° C. the value is about 25 calories per degree per hour per square metre. At 28° C. it falls to 10, but at 22° C. has fallen to 9 only. Thus although vasoconstriction is an important defensive device against cold, it is called into play at a comparatively warm environmental temperature. Below this level other mechanisms must be used to prevent a fall in body temperature. Of these an increased heat production is important. This is first of all brought about by an increased tonus of skeletal muscle and later by shivering and teeth chattering. These changes necessitate control by the central nervous system and are also dependent upon endocrine factors, notably upon the activity of the thyroid and adrenal glands. Vasoconstriction in response to cold is rapidly followed by a decrease in blood volume and diuresis. The latter phenomenon is familiar to aeroplane travellers in the tropics. These changes are always associated with some subjective discomfort and it is to avoid this that clothes are worn.

To what extent it is possible to improve the efficiency of these physiological processes it is difficult to say. Some people undoubtedly stand cold better than others. The increased susceptibility of the patient with hyperthyroidism to the discomfort caused by cold is a well-known clinical phenomenon. Certain occupations, for instance that of the professional



# CLOTHING

By R. PASSMORE, D.M.

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THE wearing of clothing serves four main purposes. First, it reduces the loss of body heat and so helps to maintain body temperature and to keep the individual warm and comfortable. Secondly, clothing protects the body against a great variety of external hazards and injuries. Thirdly, it helps to preserve the modesty of the sexes. Fourthly, it is used to denote the rank, status and position in society of the wearer. The protective function of clothing has been a special study of fighting men since time immemorial. A great number of types of personal armour have been designed, used and then discarded. In the last war many types of protective clothing were devised, specially impregnated so as to be at the same time both weather-proof and to provide protective camouflage concealing the wearer against his background. In this way conscious designs for protective mechanisms arose from methods which have long been in use lower down in the evolutionary scale. In our age the importance of protecting the industrial worker against both the mechanical and chemical hazards of his work is being increasingly realized. A wide variety of specialized industrial protective clothing has been produced. At all times fashion has been of immense importance in determining the nature of individual dress. It is now the chief factor in deciding the nature of the clothes which most of us wear from day to day. An excellent scientific account of some of the ways in which fashion operates is to be found in Professor J. C. Flugel's book, "The Psychology of Clothes". This article is not concerned with either the nature of fashion or the protective function of clothing, but will consider only how clothing operates to assist the normal physiological mechanisms for maintaining body temperatures and keeping the individual warm and comfortable.

## INDIVIDUAL REACTION TO COLD

A man may sit naked in a room free from draughts in comfort at temperatures between 77° F. and 86° F. (25° C. and 30° C.). Above these temperatures he will feel unpleasantly hot, the degree of discomfort depending upon the humidity as well as the actual temperature. The relative humidity of the atmosphere is of immense importance in determining comfort in the tropics and in certain conditions of industry in this country. However, at the environmental temperature normally found here, only a small amount of water vapour can be present in the atmosphere and the amount has little effect on comfort. At lower temperatures, 60° F. (15.6° C.) a naked man will feel cold and at 50-55° F. (10-12.8° C.) he will in a few minutes feel intensely cold and begin to shiver. There is a wide variation in the temperatures at which different individuals and ethnic groups feel discomfort from the cold. That some men can adjust themselves to survive

*Rayon* (artificial silk).—Various types of rayons exist, all of which are derivatives of cellulose. In the best qualities the smoothness, lustre and glistening of real silk are well reproduced. Rayons are not so strong as cotton or silk, but sufficiently so for ordinary purposes. Artificial silk is widely used for the manufacture of hosiery and underwear, being frequently mixed with both cotton and wool fibres. It is much cheaper than natural silk.

*Cotton* is the downy hair of the seeds of cotton plants which are grown widely throughout the tropics and subtropical regions. It is made into sheeting, calico, towels, fustian and flannel. When mixed with wool it constitutes the merino of vests, socks and many fancy materials; it is also frequently mixed with both natural and artificial silk. The great advantages of cotton are its strength, the ability to stand hard wear, the absence of shrinkage and its relative cheapness. Its pore volume is variable. It is usually woven much tighter than other fabrics and so is a relatively rapid conductor of heat. It also absorbs moisture badly. On these accounts it is not ordinarily suitable for undergarments. However, these drawbacks can largely be overcome by "mesh" weaving, and aertex and similar undergarments have proved both profitable and hygienic.

*Linen* is made from the stalks of flax plants, at one time widely grown in this country. Linen resembles cotton in being a relatively good conductor of heat and a bad absorbent of moisture. It has, however, a smoothness and lustre which have made linen invaluable as a material for collars, shirt-fronts, sheets, laces, and so forth. Their cost is a great drawback to the wider use of linens.

Waterproof and windproof garments are made completely impermeable to air. Hence sweat and moisture accumulate inside. They thus become stuffy and uncomfortable and are only suitable as overcoats. The sleeves and neck of these garments must be made loose.

It may be said that fabrics conduct heat in the following order:—

Linen  
Cotton  
Silk  
Fur  
Wool

Hence it follows that the reverse order of "warmth" holds. This is only a generalization, as warmth depends primarily upon the percentage of air space in a garment. This in turn depends upon the method of weaving. So all soft "furry" fabrics, no matter from what fibres they are made, will be warmer than shiny, smooth material.

#### PRACTICAL ASPECTS

What practical advice can be given about clothing? How is it possible to mitigate the discomforts of a severe winter under the constant threat of a breakdown in the coal supply and with a strictly limited number of coupons available for the purchase of clothing? It is important to keep the physiological mechanisms for the maintenance of body temperature, limited though

artist's model, demand an efficient adaptive mechanism. To what extent can this be acquired by training? The study of the mechanism is difficult as it demands an assessment of comfort, a subjective phenomenon impossible to measure.

#### THE FUNCTION OF CLOTHING

The chief function of clothing is to provide a micro-climate around the skin approximating to a temperature of about 30° C. (86° F.). How this is brought about by different articles of clothing is shown in the following readings by Rubner, quoted by Hill (1920):—

	Room Tempera- ture 10° C.	Room Tempera- ture 26° C.
Temperature of surface of coat .....	21.8° C.	28.0° C.
Temperature between coat and waistcoat ....	23.1	28.8
Temperature between waistcoat and linen shirt	24.4	29.3
Temperature between linen shirt and wool vest	25.2	29.6
Temperature between wool vest and skin ....	32.7	32.1

The main mechanism of this function of clothing is by providing a layer of still air outside the body. Air is a poor conductor of heat. The degree of air insulation is proportional to the "pore volume" of the clothing. This depends both upon the nature of the material from which the cloth is made and also upon the manner of weaving. Clothing also plays a part in the prevention of heat loss by its capacity to absorb water. Dry clothing fibres absorb the condensed moisture with evolution of heat. This moisture is then given off slowly.

#### CLOTHING MATERIALS

The way in which the different fibres used for making clothes vary in these respects may now be briefly summarized from the account given by Adam and Boome (1940). It must, however, be remembered that many articles of clothing are now composed of mixtures of different component fibres.

*Wool* is a modified form of hair obtained from sheep, goats, camels and other animals. It is made into flannel, cloth, blankets, worsted and knitted garments. Wool is a poor conductor of heat owing to the high "pore volume" of woollen fabrics. Hence it is an effective insulator. It also absorbs moisture rapidly and gives it off slowly and so there is less cooling produced by evaporation from woollen garments than from any other material. It is thus the warmest of clothing. It has the further advantage of elasticity and resiliency, which prevent it from clinging to the skin. The great disadvantage of wool is that during washing the fibres tend to harden and shrink. A further minor disadvantage is the roughness, which may cause irritation.

*Silk* is a fibre produced by the caterpillars of certain moths. Silk production is centred mostly in China, India and Japan. It is made into satins, plushes, velvets and ribbons, and is incorporated into woollen garments to give them lustre. Most silks have a high pore volume, but it is a poor absorbent of moisture. It therefore feels warm in winter and cool in summer. Its attractiveness lies in the strength and lustre of the fibres and the fineness with which it can be woven, giving a smoothness and softness to the material. Its great disadvantage is its expensiveness.

# THE SYMPTOMATIC TREATMENT OF BRONCHIAL ASTHMA

By H. HERXHEIMER, L.R.C.P.S.

*From University College Hospital, London.*

PERMANENT cures are rare in bronchial asthma. Even if the hunt for the allergen has been successful, and desensitization, specific or non-specific, has been carried through, the improvement may be temporary only. It must not be forgotten that asthma, as many other diseases, shows spontaneous remissions. An injection treatment lasting for several weeks or months is likely to lead to such a remission, although it is often claimed to be the result of treatment. Looking through the literature one cannot help being surprised at the wealth of quite different remedies for asthma, for which a high percentage of cures has been claimed. At least in some cases the doctor seems to have been as impressible as the asthmatic patient, with whom every new treatment may act like a charm—but only once.

The practitioner will again and again be confronted with the asthmatic attack. To deal efficiently with it, seems at least as important as the long-term treatment. The difficulty lies in the different reactions of the patients. Perhaps it will be useful to give a brief account how the day-to-day management may be carried out. The means at our disposal are:—(1) Inhalation of mixtures of adrenaline, papaverine and atropine; (2) ephedrine (orally); (3) adrenaline injections; (4) aminophylline (intravenously); (5) aleudrine (sublingually and by inhalation); (6) diverse drugs; (7) glucose (intravenously); (8) sedatives; (9) breathing exercises.

## THE ACUTE ATTACK

*The light attack* is usually treated with success by inhalation only. An atomizer must be used which emits a sufficiently fine vapour, the droplets of which must not exceed  $0.5 \mu$  in diameter. As inhalant a mixture of papaverine, adrenaline and atropine methylnitrate is used. There is reason to believe that the papaverine (1 per cent.) is the main agent in this mixture. Although this inhalation should last for several minutes, and at least two minutes longer than the moment when relief is experienced, it is recommended to take at the same time ephedrine, the action of which needs about one hour to develop. As regards the dosage of ephedrine see page 400.

*The severe attack.*—Ephedrine is useless, and inhalation has usually an alleviating effect only. Adrenaline 1:1000 should be given subcutaneously. The dosage must be sufficient, and it is no use in a severe attack to try 5 minims (0.3 c.cm.) only. The aim must be to cut off the attack completely. Usually 15 to 25 minims (0.9 to 1.7 c.cm.) are necessary and, in order to get a quick result, it is suggested that it be given in 3 to 5 injections simultaneously, in order to obtain a higher rate of absorption (to inject 20 minims (1.2 c.cm.) in one place means very slow absorption owing to the

these be in their range, as efficient as possible. Some degree of acclimatization to cold, some lowering of the threshold of discomfort, is possible for all. There should be no hurry to put away summer clothes and assume permanently winter garments. It is important in this country to dress for the day rather than the season. In our variable climate warm days in winter are as common as cold days in summer. Since the main physiological response to cold is a vasomotor phenomenon, it is reasonable to put the vasomotor system through its paces regularly. This is best done by regular exercise. For the young this is natural and usually easy: for the elderly it is more difficult. But in our artificial urban civilization, it may be good advice to tell a middle-aged or elderly man to forego a bus or tram either to or from his daily work and take a twenty-minute or half-hour walk. Even such mild but regular exercise may greatly increase a man's sense of fitness and resistance to cold.

Tremendous changes have taken place in women's dress during this century and women are, for the most part, now comfortably and sensibly dressed. Corresponding improvements in men's habits have not taken place so generally. Long underpants are still often exhibited to us in the consulting room, instead of being relegated to the museum where they rightly belong. Layer upon layer of waistcoat, pullover and jersey are still frequently seen. These can only result in the accumulation of perspiration and moisture, a damp, unhealthy, tropical micro-climate beneath the underclothes. Such customs and practices the doctor must do his best by education to abolish. It is important to look out for the infant, who is often an unwilling, though sometimes noisy, sufferer in this respect from his parents' ignorance of hygiene. A multiplicity of baby clothes may be the real cause of much infantile discomfort.

To sum up, there is an analogy between the present problems of clothing and food shortages. In both cases there is a minority of the people (relatively small, but representing large numbers of individuals) who do not use the materials that are available for them to the best advantage. There is still a vast scope for education in healthy habits of clothing, as in the right use of food. In this field the medical profession has the opportunities and it is our duty to teach the principles of hygiene whenever occasion arises. No amount of education, however, can make good an absolute deficiency of either coal, clothing or food; nor can advice alleviate the discomforts and dangers to health that may arise from these causes.

### References

- Adam, L. C., and Boome, E. J. (1940): Notter and Firth's "Text Book of Hygiene," 10th edition, London.  
Goldby, F., Hicks, C. S., O'Connor, W. J., and Sinclair, D. A. (1938): *Austral. J. exp. Biol. med. Sci.*, 16, 29.  
Hill, L. (1920): *Med. Res. Coun. Spec. Rep. Series No. 52.*

the concomitant vasomotor rhinitis.

### THE PREVENTION OF ATTACKS

This aim is at least as important as the treatment of the attack itself. If the patient learns to cut short an attack at its very onset, a major attack can often be avoided, and the dosage required at this time will be much smaller than later on. He must be instructed to carry his inhaler with him and to inhale at the slightest sign of a developing wheeze. If, as in many cases, there is a certain time of the day or the night when an attack regularly threatens, ephedrine in sufficient dosage should be taken one to two hours in advance. It is often possible to manage such cases very satisfactorily, but it requires intimate knowledge of their individual history. For instance in those cases of asthma in which the bronchial spasm is confined to slight nightly attacks, a new antihistamine drug, neoantergan (anthisan), seems to have a beneficial effect when taken at bedtime in dosage of 0.2 gm.

If an allergen is definitely known to cause attacks it should, of course, be removed.

In some cases a vasomotor rhinitis appears to be not only an accompanying disturbance but the cause of the subsequent asthmatic attack. It is difficult to recognize whether the asthmatic has a new infective cold or an attack of vasomotor rhinitis, and it is always advisable in a doubtful case to give benadryl in order to cut short the rhinitis.

### GENERAL MEASURES

*Breathing exercises.*—These can be of great advantage in asthma, but must be used with discrimination. The leaflet issued by the Asthma Research Council gives sound advice about the technique of the movements. They are aimed at getting the chest deflated and bringing the abdominal muscles into action. The latter are used in order to support the action of the diaphragm, which, in many asthmatics, stands low and hardly participates in the breathing movements. If the patient succeeds in relaxing his breathing musculature, it is usually possible to make him use his abdominal wall and diaphragm again; but this often causes great difficulty.

The patient should not be allowed to inhale or exhale as deeply as it is possible for him. Often these maximum respirations lead to an arrest of the diaphragm in the end position, from which there is a gradual return only. The breathing exercises should never be rapid—a rhythm of 10 to 12 is preferable—or prolonged, as hyperventilation may provoke an increased spasm. In most cases a spirometric graph of the respiration will be a sufficient guide to how the exercises should be carried out.

*Sedatives*—barbiturates—are indicated in all cases in which excitement plays a part. They are often necessary to counteract the stimulating effect of the evening dose of ephedrine. The dose must be varied individually to give the desired effect.

local action of the hormone). If the spasm recurs after some hours, repeated injections are required; in chronic asthmatics a certain tolerance to adrenaline is observed which requires higher dosage. In some acute attacks a small amount of morphine,  $\frac{1}{4}$  to  $\frac{1}{2}$  grain (8 to 11 mgm.), if given with the adrenaline, is useful. Morphine alone may prove fatal. Adrenaline intravenously has a very fleeting effect and does not appear to be more useful than the subcutaneous administration. Adrenaline in oil, on the other hand, has a protracted effect, and is more useful in the asthmatic state than in the acute attack.

In some cases aminophylline intravenously (0.24 to 0.48 gm.) relieves the attack when adrenaline has not been successful. It is, however, possible that in such cases the adrenaline was tried in too small amounts. Glucose, 5 per cent. (1000 to 1,500 c.cm.), intravenously has also been used with success in intractable cases.

#### THE CHRONIC ASTHMATIC STATE

Many asthmatics, even the slight cases, have a chronic bronchial spasm also during the apparently free intervals, unnoticed by them. A reliable sign of bronchial spasm are rhonchi which can be elicited at the end of a maximum expiration. The removal of this condition is most important as it forms the basis on which new acute attacks develop.

Ephedrine tablets combined with inhalation are usually effective. The dosage of ephedrine, which must be varied according to the severity of the state and the tolerance of the patient, is  $\frac{1}{4}$  grain (16 mgm.) t.d.s. to 4 grains (0.25 gm.) t.d.s. The required dosage can be found by testing the vital capacity before and after ephedrine administration. The test requires the use of a spirometer and can be done in the out-patient department of any hospital. It is worth while to use it because otherwise it is hardly possible to find the effective dosage. The patient will often feel a *general* effect of the ephedrine after a small dose and report improvement, although a *bronchial* effect is completely absent. Only when the vital capacity clearly increases has the correct dosage been reached. Tolerance is easily acquired and easily lost, and therefore it is necessary to leave an ephedrine-free interval after 3 to 4 days' medication. It is recommended to give the required dose t.d.s. for four consecutive days of each week and to leave the next three days free. If ephedrine is only required twice daily, tolerance is rarely acquired. Some patients do not tolerate ephedrine even in very small doses: they have to rely on inhalation only.

Aleudrine (isopropyladrenaline) is a new drug which can be taken sublingually and by inhalation, and seems to be very effective. Not enough is known about its therapeutic range. There are a number of older drugs which sometimes prove useful, such as stramonium in various forms, felsol, and potassium iodide. They have hardly more than an alleviating effect. Benadryl, whilst usually ineffective against the asthma itself, often relieves

selves homeless. The main brunt of the work fell on the police, public assistance staff, cleansing department, city engineer's department, the Education Department and voluntary bodies; in particular the Women's Voluntary Service gave splendid help. Two war-time rest centres were reopened to provide night quarters for 450 people in one evening. The school meals service supplied meals to the homeless—nearly 7000 throughout the emergency. The resource, cheerfulness, courage and neighbourliness of the ordinary people affected by the flood were beyond praise. Special tribute is due to those who, at much personal inconvenience, gave voluntary help, especially in connexion with the sick and aged, to whom the events were a tremendous physical and psychological shock, the burden of which they could never have borne single-handed. Laundry firms and their staffs, working much overtime, rendered signal service in the reduction of the chaos by the removal, cleaning, drying, and quick returning of carpets and soft furnishings at small cost to the owners.

*Prevention of diseases.*—The earliest steps taken by the Public Health Department were precautionary measures to safeguard the health of the population. The flood water in some houses rose above the level of the lavatory seats and faeces were seen floating in the current. Instructions were circulated that all water should be boiled before use and that damaged food should be destroyed. Although early reports of bursts in the sewers were later discovered to be exaggerated, the precautions were justified, considering the filthy state of the water and that many ground-floor taps were at one period submerged.

Public Health nursing staff were on duty night and day at the rest centres, caring for old people, feeding bottle-fed babies, controlling hysterical women, and attending to sickness and minor ailments. At one centre, for example, five cases were treated for bites from rats which had been forced up from the sewers. Despite the great difficulties the municipal midwifery staff managed to carry out their duties. Not one mother needing attention or advice was neglected, although in several instances this meant wading knee-deep through the filthy water. In one case the "expectant father" had to carry the midwife on his back. Several antenatal cases were distressed and feared premature labour. Some were removed to the municipal general hospital as a precaution. Layettes, to replace those damaged by water, were distributed to those in urgent need.

As the flood subsided the opening of choked gullies and drains became a matter of urgency. Calls for the drainage inspector and his men were incessant. The staff of sanitary inspectors was concentrated in the flooded area to advise the public in the clearance of drains and sub-floor ventilators, the disposal of sludge and refuse, the cleansing and drying of bedding, and the cleansing and disinfection of premises. Some assistance was provided for necessitous cases, and a liaison maintained with other services, with this object. Stirrup pumps were lent for cleansing walls and floors; disinfectant and some 6000 bars of soap were issued free of charge. Lime was supplied



# DISASTER SERVICES

By J. L. BURN, M.D., D.Hy., D.P.H.

*Medical Officer of Health, Salford.*

SOONER or later a disaster overtakes every community. Fire and flood, war and epidemic disease, an aeroplane accident, or a railway crash may suddenly bring to their midst a need for instant help on a large scale. The atomic age opens up possibilities of an onslaught which may bring death and injury to many thousands. The purpose of this article is to plead the need for well-thought out *disaster services*: services which when needed, are badly needed.

There is no room for complacency in these matters. A recent conflagration in America in a modern hotel built of fire-resisting materials caused the death of over 100 people. In that country some thought has already been given to the proper preparation of plans for emergencies, such as tornados.

The primary requirements of such a plan are that it should be known to all officers in the Health and other Departments of Local Government; it should be capable of being put into operation quickly; it should take advantage of all sources of voluntary and official help. It should include provision for the supervision of sanitation, the organization of preventive measures, such as immunization against threatened enteric epidemics, schemes for the kindly care of the aged and ailing, the planning of emergency arrangements in hospital services, and the protection of the community from dangers of contamination of food and water.

## THE SALFORD FLOOD DISASTER

The value of civil defence personnel and services which were still left to us was brought out prominently by the experience of flood in my own area, and it may be of interest to recount this in some detail.

Over 20,000 Salford people, living in some 5000 houses were affected when the River Irwell overflowed its banks following several days' heavy rain which culminated in a precipitation of over one inch in the early hours of September 20, 1946. A low-lying area of 600 acres was flooded to a depth varying from 2 to 8 feet, causing damage at an estimated cost of £500,000, of which apparently not one penny compensation is recoverable, as the flood was an "Act of God". Flood waters reached a level 10 inches higher than in the last disaster, eighty years ago, known locally as the "Great Flood". Half of the area affected is closely built-up and the inhabitants suffered disheartening damage to their homes and belongings. In some homes, food, clothing, and furniture were washed away. Even those who were more fortunate were left with a deposit of filthy evil-smelling slime. Food and merchandise in shops were damaged by water from a river which, at the best of times, is never clean. Four schools were rendered unusable.

*Care of the homeless.*—The situation demanded every possible assistance, not only from the public health but also from the humane point of view. Splendid work was done to house and feed the people who had been driven from their homes and those who had returned from their work to find them-

stranded in the upper rooms of houses in deep water. Among the various domestic animals mentioned as having taken refuge in their owners' bedrooms was a pig. Although the soup kitchen was flooded its staff set to work providing meals in the Town Hall kitchen. By the same evening people were being put back in their homes by boats and ladders, even though the lower stories were still under water. The more unfortunate basement dwellers had to wait for the fire engines to pump their homes dry. Happily basement dwellings are no longer permitted, or else the damage to human life in the recent disaster would have been much greater. Three bodies were recovered from the waters. Curiously enough the papers of the time bore the headlines "Greatest flight of Meteors ever witnessed in History". A similar display occurred some days after the recent flood.

The measures taken against the after-effects of the flood described had the advantage of there being in existence a nucleus of organizations formed under Civil Defence measures; for example, outstanding help was given by the W.V.S. Rest Centres were promptly opened and the school meals service, expanded in the war years, was able to deal with a sudden demand for meals to feed the homeless and was of the greatest help in maintaining morale. Integration of official and voluntary services helped considerably. Valuable assistance was also given by Government Departments.

The value of preparedness was shown in this area during the war years when a train disaster occurred in an adjoining town. Some forty seriously injured patients were admitted to our Municipal General Hospital. Providentially, a resuscitation ward (prepared for the reception of A.R.P. casualties) was available. Everything was ready, from transport and stretchers to sterile equipment, drips and other treatments for shock and hæmorrhage. Above all, trained personnel were able to be summoned and set to work quickly. All knew their appointed tasks. In a matter of minutes the sufferers were admitted and the necessary transfusions and treatments started. Undoubtedly lives were saved and much suffering avoided.

**FLOODING IN MAIDENHEAD AREA—"OPERATION DRY-OUT"**  
Following the severe floods in March 1947, affecting upwards of 1,500 houses, the Borough of Maidenhead received the loan of eight R.A.F. Mobile Heating Units, for the purpose of drying the houses and their contents. The apparatus (called a "hair drier", being primarily devised for warming up air engines in cold weather) generates hot air by means of a petrol burner. In practice, room temperatures up to 200° F. were achieved. Nearly 800 rooms in 250 houses were dried by these units in 3 weeks. An official of the sanitary department of Maidenhead claims to have "reduced the degree of saturation to the greatest possible extent in the greatest number of houses in the shortest possible time". Large quantities of furniture, particularly upholstered pieces, were saved from complete ruin, although some damage by damp in glued joints proved irremediable by heat. The effect on the morale of the people was "tremendous"; the operation was justified on these grounds alone.

#### PLANS FOR DISASTER SERVICES

No great expenditure need be made on such plans. Of first importance is the need for arrangements for mutual assistance between neighbouring

and brushes lent for purifying cellars and basements. The public disinfecting station worked overtime and much bedding was taken to the hospital laundries for drying.

Subsequent warmer weather encouraged the breeding of flies in the deposit of refuse left by the water. The provision of a free disinfection service of DDT spraying for infested land and house property was valuable in reducing this nuisance and possible vector of disease. The provision of practical help and advice was greatly appreciated by the public, and the mere presence of public health personnel had a valuable psychological effect in reassuring the victims that their health was being safeguarded. All school buildings in and around the flooded area were examined. A rapid medical survey of all the children was made by the school medical officer. Every absence was followed up at his home to determine the cause of the absence. Advice was given to parents in cases of illness or hardship. Cases of defective footwear and clothing were referred to the school teachers for the issue of relief supplies. To prevent duplication the Women's Voluntary Services kept a card system of all assistance given.

The disaster was not without its rumours of epidemics. Special attention was given to some 40 cases of gastro-enteritis referred by nursing staff and sanitary inspectors. Appropriate bacteriological investigations were made, but no pathogenic organisms were isolated.

A detailed *survey of the structural damage* to houses caused by the flood was begun as soon as possible. Unoccupied premises raised a specially difficult problem, and in one instance it was necessary to obtain a warrant from the Stipendiary Magistrate to enter a house, the tenants of which were away on holiday. This house was cleansed in their absence. Particulars of flood damage to residences have been communicated to landlords, to whom support in obtaining materials to carry out the necessary repairs has been offered. It is obvious that the "life" of some of the houses has been affected adversely, plasterwork and cellar walls in particular having suffered damage. The damage to the sewers, which are mainly of loose brick construction, is not likely to be fully ascertained for some time.

*Furniture.*—Much complaint was made of smell proceeding from sodden furniture, due to fungus growths. Effective treatment was given by removal of the furniture to a vacant room in a factory building where there was a supply of hot, dry air, by which furnishings were dried out. Additionally, soft furnishings were treated with a new product, "shirlan B" (I.C.I.), a potent fungicide. Attempts by the use of proprietary scented disinfectants to drive out one smell with another had proved useless.

In spite of the havoc not a single fatality or casualty was reported and no epidemic or serious health problem has resulted.

It is interesting to compare the present disaster with that of 1866. About 200 women and children were lodged in the Town Hall, the men being sent to the gas works, presumably to dry off. Sleeping accommodation was provided at the workhouse. Carts and cabs were used to evacuate the people, most of whom went to the homes of sympathizers. Eight boats were brought from Belle Vue to evacuate those

cost of non-segregation of the sexes and lowered hygienic standards. There is always criticism of official orders of the type of "males to the right, females to the left", and these orders are always broken.

Obviously *children* require special inspection and care. Facilities must be provided for laundry, and it will be necessary to insist on regular washing of the babies' napkins, and so on. Special watch must be kept for the occurrence of infectious diseases. Equipment useful in respect of children includes the following: measures for preparation of baby feeds, hot-water bottles, layettes, baths and bowls, and stores for beds, mattresses and blankets.

It must be remembered that telephones and roads may be, in some disasters, unusable. Alternative means of communication should be the subject of forethought, for mobility of equipment is essential.

### CONCLUSION

The great disasters of modern history have resulted in large relief funds of many thousands of pounds often drawn from all parts of the earth. My plea is for foresight and the expenditure of a small amount of money by local authorities on the organization of disaster services ready to save life and health when an urgent large-scale need arises. There is a popular impression abroad that the atomic bomb explosion obliterates everything and there is no need to make hospital arrangements. The weapons of warfare are now pointed not at a chink in the armour of the warrior, but at men, women and children, at work and at home. Victory depends upon the physical and moral survival of the civilian. Apart, however, from any question of atomic explosions there is need for preparation against peace-time emergencies. All practitioners should be prepared, so far as possible, to meet disasters which occur sooner or later in every community.

### Bibliography

In addition to A.R.P. literature, the following list provides interesting and helpful descriptions of methods used in overcoming the many difficulties in bringing material, medical and moral aid in large-scale disasters.

Abbott, W. E., and Hirshfeld, J. W. (1943): "Problems of hospital organization presented during Detroit race riot," *J. Amer. med. Ass.*, 122, 946.

Carll, F. W., Deaver, J. M., and Phillips, R. B. (1944): "Norfolk explosion disaster," *Nav. med. Bull.*, Wash., 42, 284.

Cope, O. (1943): "Care of victims of Cocoanut grove fire at Massachusetts General Hospital," *New Engl. J. Med.*, 229, 138.

Faxon, N. W., and Churchill, E. D. (1942): "Cocoanut grove disaster in Boston; preliminary account," *J. Amer. med. Ass.*, 120, 1385.

Gorrell, J. (1943): "Lessons from Boston tragedy," *Mod. Hosp.*, 60, 55.

H.M. Stationery Office (1946): "The effect of Atomic Bombs" at Hiroshima and Nagasaki," London.

Yeager, C. F. (1943): "Planning for disaster," *Conn. med. J.*, 7, 51.

Young, R. F. (1942): "Public health problems created in flood disasters," *N.C. med. J.*, 3, 8.

See also Index—*Cat. Surg. Gen.* (1939), 4, 528 (Disaster); *Ibid.* (1940), 5, 21 (Earthquake), and 1027 (Flood).

areas. In the schemes which are to be submitted to the Ministry of Health in connexion with Ambulance Services the principle of mutual assistance has been emphasized. There must also be, as in war time, the pooling of resources, such as ambulances, first-aid equipment and stretchers, down to important details, such as hurricane lamps. Included in the plans should be lists of names, addresses and telephone numbers of key personnel—doctors, chemists, midwives, voluntary helpers. Such preparation avoids loss of valuable time. The plans should be revised periodically, duplicated and preserved in places that will not all be involved if a disaster occurs.

Personnel, such as hospital staffs, might well have a quarterly or yearly practice on lines reminiscent of Civil Defence exercises. Stocks of sterile linen and equipment, penicillin preparations, drips, and the like, might well be reviewed at intervals. As Colebrook, in commenting on a recent American disaster, has asked: "Which hospital can cope effectively with 5-50 severely burned cases?" He points out that two Boston hospitals had to deal at once with 170 such cases. It is important before it is too late to preserve and encourage a nucleus of trained workers; occasionally, technical and social meetings can be held and something of the splendid war-time spirit of unity and comradeship fostered. As an example in preserving efficiency, ambulance drivers, for instance, should be encouraged to take a yearly refresher course in first-aid efficiency. Some authorities pay a small addition to the drivers' wages if they keep up to date in their work.

*Equipment* should, so far as possible, be of size and suitability capable of easy use and interchange in any area. The fighting services have helped greatly in recent disasters with their mobile equipment, for example with cooking stoves. Gone are the days when the public would be satisfied in emergencies with a cup of tea and a snack: if the emergency lasts over some time morale needs support by a proper meal.

*Medical attention.*—Of fundamental value is the visit of practitioners and nurses to the area as soon as possible. The presence of well-recognized faces and persons is of great help to morale. Always there must be provision for a first-aid post or other place where medical and nursing treatment may be given, and provision for the isolation of possible infectious cases. A list should be available of the names of medical practitioners who are willing and able to turn out at a moment's notice in response to a call.

*General measures.*—In ordinary peace times every effort should be made to have close contact with organizations such as the W.V.S., the British Red Cross Society, and the St. John's Ambulance Brigade, so that the Health Department has a list of members. A list of firms and individuals who are handy men, such as plumbers, electricians, and the like, is also useful. Arrangements should be complete for the prompt removal and decent burial of the dead. Nothing destroys morale so much as the sight of human remains lying around without attention. In disasters it is wise to recognize the strength of the family instinct, and arrange that relatives and friends should so far as possible be kept together in the same quarters, even at the

nervous patient if scrupulous attention is paid to the site of injection, the sharpness of the needle, the absence of surgical spirit (needles should be boiled in oil, or syringed through with distilled water before use), and the complete relaxation of the part to be injected.

Much unnecessary pain is caused in the treatment of accidents and the changing of dressings, and I would like to repeat the simple set of rules which I suggested in a previous article in *The Practitioner* (1938) should be incorporated in every first-aid manual and taught to every medical student and nurse. They are as follows:—

- (1) Handle all injured tissue gently; it hurts.
- (2) Hold an injured limb firmly, but never squeeze it.
- (3) Always combine gentle traction with the support of an injured limb.
- (4) Lacerated tissue is far more sensitive than ordinary skin. Do not therefore drag off clothing, or anything which may be adhering to an open wound. Bathe it off with warm sterile water.
- (5) Never apply irritating antiseptics, such as surgical spirit or tincture of iodine, to an open wound.
- (6) Always have sufficient helpers at hand before lifting an injured patient, and first immobilize the injured part by some form of temporary splint or appliance.
- (7) Arrange the pillows or cushions in the stretcher or ambulance in such a way as to support and relax all muscles acting on the injured part.

The use of local analgesics for minor operations or for the setting of simple fractures (e.g., a five-minutes' pack of 5 per cent. procaine or novutox, before stitching a cut; or the injection of 20 c.cm. of 1 per cent. procaine into the area surrounding a fracture, after aspiration of the effused blood); the intradermal injection of 2 per cent. procaine, injected very slowly, before the use of an aspiration needle; and the employment of non-adherent dressings, such as sterile vaseline gauze, paraffin strips or dressings impregnated with nupercainol, or with an emulsion of acriflavine in paraffin (1 in 1000), will all help to reduce or eliminate pain during the course of minor surgical procedures or when dressings are being changed. The passage of a catheter on a male patient is by no means always a painless operation, especially in cases complicated by some degree of urethritis, and the method originally suggested by Winsbury-White (1939) is of great value in such cases.

#### TREATING THE CAUSE

The investigation of the cause of any pain is an essential preliminary to the accurate diagnosis and treatment of the underlying disorder, but it is equally essential as a guide to correct measures of relief. The so-called "shoulder-tip pain" may be local in origin, but on the other hand it may be due to a subphrenic abscess, a perforated duodenal ulcer, a diaphragmatic pleurisy or even a ruptured ectopic gestation. Pain in the lower limb may be caused by an inflamed hip-joint, the herniated nucleus of an intervertebral disc or a spinal radiculitis; whereas upper abdominal pain may not be due at all to any disturbance or disease of the abdominal viscera, but to a basal pneumonitis, a coronary thrombosis, or the lightning pains of tabes.

# PAIN AND ITS PROBLEMS

## XI.—PRINCIPLES OF TREATMENT

By HAROLD BALME, O.B.E., M.D., F.R.C.S.

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IN the first article of this series Professor Adrian (1947) made the interesting suggestion that the main reason for afferent pain impulses travelling up to the cerebrum is to stimulate human brains and minds to find means of alleviating them. Such a task has been one of the chief concerns of physicians in all the ages. Ever since the first witch doctor brewed a bowl of henbane and the first Chinese physician discovered the use of the seton the medical profession has been seeking means of alleviating pain, for pain is the dominant symptom which induces the large majority of patients to seek medical aid. Problems of diagnosis, a wider understanding of the etiology and course of disease, greater refinement in pathological investigation, radiological interpretation and surgical technique, and a better appreciation of the range of chemotherapy—all represent major interests to the scientific physician or surgeon. But to the patient himself the relief of pain is the clamant need.

The true nature of pain, and the part which it has to play in the protection and well-being of the human organism, are both alike so complex that any attempt to separate it from other symptoms of disease or trauma, or to treat it without reference to its causation or associated disabilities, would be mere empiricism. There are, however, certain well-established principles along which relief of this dominant symptom may be sought, without in any way interfering with the investigation and treatment of the complaint which has caused it, and it is the purpose of this article to give a brief summary of the various measures which may be employed.

### PREVENTIVE MEASURES

Conditions of life to-day do not tend to produce placid nervous systems. The rush of modern activities, the frustrations and difficulties of daily work, the sense of insecurity and uncertainty as to what the future may hold, all combine to fret nerves and harass spirits. In such circumstances all forms of discomfort are apt to assume greater proportions, and pain may easily become an object of dread. Greater awareness to pain, and a more disturbing reaction to its ravages, are part of the price we pay for our higher civilization. And the wise physician of to-day—and, even more, the wise surgeon or dentist—will never regard it as waste of time if by sympathetic approach and by careful use of preventive measures he can earn the reputation of never hurting his patients. Even so ordinary a procedure as the giving of hypodermic or intramuscular injections can be robbed of its terrors for the

liminary to volitional movement, and not as a constantly repeated anodyne.

Rest and posture necessarily take pride of place in the physical treatment of painful conditions, particularly during the early stages of trauma and during any period of acute inflammation, but every care must be taken to prevent future disability by complete and prolonged immobilization, such as would only lead to atrophy of muscles and the formation of painful adhesions. This is strikingly seen in the modern treatment of fractures, where daily exercise of the muscles of the affected limb (with due precautions to prevent the displacement of fragments) has successfully superseded the old technique of prolonged splintage. In securing physiological rest to an affected part it must be remembered that mere recumbency will not suffice. What must be aimed at is complete relaxation of the muscles guarding the inflamed or injured tissues, by means of suitable supports and pillows, and the adoption of such a position as will provide the most effective drainage or dispersal of inflammatory exudates (e.g., the sitting position, with ample back pillows, for an acute frontal sinusitis) and the minimum of tension for an inflamed joint or viscus.

The use of heat and cold is perhaps the greatest of all physical measures for the alleviation of pain, the former acting as a direct sedative to inflammatory tissues and a means of assisting the absorption of local exudates, the latter acting partially as a local analgesic and partly as a vasoconstrictor. Heat is applied in a number of different ways: moist heat in the form of kaolin plasters, mud packs or baths being more usually prescribed for the relief of pain caused by superficial swelling or inflammation, dry heat in the form of infra-red irradiation or diathermy being utilized for the "decongestion" of deeper tissues.

Massage has definite value in the early stage of inflammatory swellings and in the treatment of fibrositis and various forms of myalgia and, when combined with some form of heat, makes an excellent preliminary to more active forms of remedial exercise. Ionization and diathermy, when prescribed by experts with careful selection of suitable cases and accurate dosage, have a wide range of usefulness in relieving the pain of certain forms of neuritis, arthritis and other intractable complaints; they probably act by producing local hyperæmia and accelerating the absorption of exudates and other inflammatory products. But perhaps the most successful of all electrotherapeutic agents for the relief of pain is short-wave diathermy—now so widely used in the treatment of boils and carbuncles, as well as many forms of deep inflammation.

There is thus a large number of physical measures which can be employed in the treatment of pain, all of which are of great value in the early stages of painful disorders and all of which are greatly appreciated by patients, but most of which are only too liable to degenerate into mere "placebos" unless kept under strict medical supervision and associated with constant investigation and therapeutic research.



Although the conditions which may give rise to pain in the human body are innumerable, the actual factors leading to stimulation of *pain fibres* can be reduced to simple proportions. Thus there may be direct irritation of nerve endings, such as may be brought about by mechanical factors operating in exposed tissues; by chemical substances, such as the H-substance postulated by Lewis as occurring in acute inflammation; or by certain pathological processes, as in some forms of ulceration and new growth. There may be irritation of peripheral nerves or of nerve roots, such as that produced by the presence of a foreign body or a displaced bone, or by such local pressure as may be caused by inflammatory products in a confined space or by a neoplasm. There may be the acute pain of muscle spasm, such as that associated with the myocardial ischæmia of coronary disease or the intense cramp of Buerger's disease. Or there may be the pain of overstretching, as in an acutely distended viscus or the passage of a calculus through a narrow duct. Such a classification of exciting causes of pain is, of course, an over-simplification, and there are many forms of pain which will not fall into such a category, particularly those of central origin. It is, however, a useful guide to the more common causes of pain and to the measures necessary for its relief.

In attempting to discover and remove the cause of any particular form of pain, it is of the utmost importance to see and understand the whole process, and not merely one aspect which happens to be fairly obvious. It is easy to diagnose a condition as neuritis and treat it accordingly, but it will not relieve the patient if the true source of the pain is a spinal neoplasm or a displaced disc. The starting pains of a tuberculous hip are caused by the irritation of inflamed surfaces during periods of muscular relaxation, and are easily alleviated by muscular traction; but excessive traction may give rise to the pain of over-stretched muscle. The aching pain of a sprained ankle, or the dull ache of a chronic synovitis of the knee, is due in both cases to the pressure of inflammatory products, and considerable alleviation can be obtained by the use of rest and massage and heat. But, as Leriche (1936) was the first to demonstrate in the case of sprained ankles, and as many orthopaedic surgeons have demonstrated in the case of chronic synovitis of the knee, it is active exercise rather than passive physiotherapy which is the best means of removing the inflammatory exudate which is giving rise to the pain. The actual cause of a pain can therefore only be decided after a full and comprehensive investigation, and it is only in the light of such knowledge that appropriate measures of relief should be prescribed.

#### PHYSICAL TREATMENT

Physical medicine has always made a noteworthy contribution to the relief of pain, and although it is now generally conceded that there has been a tendency in the past to over-emphasize the more passive forms of physiotherapy, such measures will always have real value if regarded as a pre-

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the analgesic effect; or pethidine ( $\frac{1}{2}$  grain (33 mgm.)) can be used in place of such derivatives, if preferred. When these fail to give relief, some form of opium will be necessary, as there is no drug which has yet been discovered which can really take its place. Dilaudid, dicodid and eukodol are all said to have a greater potency than equivalent amounts of opium or its alkaloids, but they all appear to suffer from the same disadvantages of toxicity and risk of addiction.

The use of amidopyrine (pyramidon) is very common on the Continent and in the United States, particularly in such conditions as frontal headache, neuralgia and dysmenorrhœa, and there is no question of its analgesic effect, especially when in combination. It suffers, however, from the disadvantage of a slight risk of agranulocytosis, if constantly administered.

Of the morphine derivatives, heroin appears to be the most rapid in producing addiction. This is unfortunate, as it is by far the most effective form of analgesic for some of the more intractable forms of spinal root pain.

#### SURGICAL PROCEDURES

For long-continued and intolerable pain, surgical measures, wherever practicable, should be employed. These may consist in the injection of nerve trunks (or, better still, of nerve ganglia) with 95 per cent. alcohol, as in the treatment of facial neuralgia, of angina pectoris, or of intractable pain occurring in the pelvis and lower extremities; they may entail the removal of sympathetic nerves and ganglia, as in the presacral neurectomy performed for relief of malignant or tuberculous ulceration of the bladder, or severe dysmenorrhœa, or ganglionectomy for intense trigeminal neuralgia; or the division of the spino-thalamic tract in the spinal cord, as now practised in most cases of intense and incurable pain. Whichever method is employed, treatment must not only be in expert hands but must be adequate. In the past there has only too often been a tendency to try a sympathectomy when nothing less than chordotomy can give any hope of lasting benefit.

#### PSYCHOGENIC PAIN

In formulating a suitable line of treatment for the relief of pain, the possibility of its being psychogenic in origin must never be forgotten, for nothing is worse in such cases than the adoption of a long course of physical treatment or analgesic remedies. The skilled services of a psychiatrist are essential for the treatment of any patient whose symptoms of pain refuse to fit into any known anatomical pattern, or whose pains recur at precise intervals or under conditions of emotional disturbance, and who is not relieved by ordinary analgesic measures.

#### References

- Adrian, E. D. (1947): *The Practitioner*, 158, 76.  
Balme, H. (1938): *Ibid.*, 141, 757.  
— (1939): "The Relief of Pain," 2nd edition, London.  
Leriche, R., and Arnulf, G. (1936): *Amer. J. Surg.*, 32, 45.  
Winsbury-White, H. P. (1939): *Brit. med. J.*, 1, 227.

## LOCAL APPLICATIONS

In treating the more superficial forms of pain, such as those associated with certain forms of neuritis, inflammatory conditions and ulceration, the use of local applications is often desirable, both as a means of protecting an exposed surface and of providing some form of analgesic for the irritated nerve. The use of non-adherent dressings, or of an analgesic ointment such as nupercainal, has already been referred to; the latter is of particular use when treating painful sores and fissures, or herpetic eruptions.

Painful inflammatory swellings are usually relieved by applications of local heat in the form of short-wave diathermy and kaolin plasters, whilst analgesic liniments or ointments are valuable in treating neuritic pain. Compound chloral and camphor paint or compound methyl salicylate ointment (B.P.C.), warmed before use and painted on thickly, is often beneficial in neuralgic or rheumatic conditions; whilst for larger areas of superficial pain, such as may be found in cases of acute phlebitis or peripheral neuritis, relief can often be obtained by the use of an analgesic liniment, such as liniment of aconite with oil, compound liniment of chloral, compound liniment of methyl salicylate, or Martindale's methyl-aspidrodine liniment. They are best administered by being thoroughly warmed and then rubbed in liberally and lightly, the affected part being wrapped up loosely in cotton-wool or gamgee tissue. The various forms of analgesic balm, usually consisting of a combination of menthol and methyl salicylate, are sometimes found to be more efficacious in relieving neuralgic pain than hot applications.

## ANALGESICS AND OTHER DRUGS

In acutely painful conditions, or long-standing pain which does not respond to local treatment, the use of analgesic drugs is not only desirable but essential. The prescription of such drugs must always be governed by consideration of suitability, potency, and risk of addiction. Certain drugs have what may be regarded as a specific action in the relief of pain associated with certain disorders, such as the salicylates in acute rheumatism, aspirin and its compounds in the myalgias, colchicum or its derivatives in gouty conditions, the nitrites in any form of pain due to arterial constriction and muscular spasm, and atropine in iritis or in pyloric spasm. Other examples of suitable analgesic drugs are the use of gelsemium in facial neuralgia, of belladonna and hyoscyamus (in an alkaline solution) in inflammation of the base of the bladder, of vitamin B<sub>1</sub> preparations in certain forms of polyneuritis, and of sodium chloride in copious draughts of water in the treatment of heat cramps.

The potency of most analgesic drugs is limited in range, and recourse is usually had to some derivative of opium, as a means of reinforcement. The addition of powder of ipecacuanha and opium [2 grains (0.13 gm.)], of codeine [1 grain (65 mgm.)], of heroin [ $\frac{1}{8}$  grain (11 mgm.)] or of morphine [ $\frac{1}{4}$  grain (16 mgm.)] to each 5 or 10 grain tablet of aspirin, greatly increases

to about no. 8 Hegar. A cauterization can be performed by the bayonet-shaped platinum point breaking into the Nabothian follicles, burning the area of the erosion and biting into the whole of the endocervix in its circumference. There is no risk of a subsequent stenosis, although it is essential to bear in mind the most common complication, which is a secondary hæmorrhage caused by separation of the slough from ten days to three weeks after operation. The same result can be obtained by the diathermy and special terminals used to "cone out" the endocervix. During the period of convalescence and repair, daily packing with gauze soaked in paraffin and flavine, or twice daily douches with alum, are ordered.

More radical surgical procedures are occasionally indicated—trachelorrhaphy, amputation of the cervix, or hysterectomy. The scope of the first is limited to cases of cervical tears with just a mild exacerbation of "physiological" discharge—no gross endocervical discharge seen with the speculum, no Nabothian follicles. Amputation of the cervix is sometimes indicated when there is gross tearing with hypertrophy, perhaps Nabothian follicles, and much discharge. In a young woman it should be avoided if possible for fear of subsequent miscarriages or stenosis. In some cases, particularly if the symptoms have not responded to more conservative measures, hysterectomy may be advisable on the grounds of it being a pre-cancerous cervix.

The zinc chloride stick is sometimes used. This clay stick impregnated with zinc chloride, which will produce a slough of the surrounding tissues, must fit the cervix firmly, and care must be taken to guard it from healthy surrounding vaginal tissue by packing. The same danger of secondary hæmorrhage is present here, and on the whole the treatment is not popular. Other methods of treatment hardly justify reference.

(2) *Infection*.—These cases supply a large percentage of the cases of "discharge" reporting to a general practitioner. *Trichomonas* infection is probably the most common. In the acute cases the vagina is tender on examination, and covered with small red spots. There is plenty of yellow, frothy secretion, and there may be an erosion of the cervix. Assuming that the diagnosis is clinched by the microscope, stavarsol tablets or "S.V.C." are indicated—two to be inserted as high as possible at night (continued during menstruation) with lactic acid douche in the morning. The vagina is usually still weakly acid in trichomonas infection. Bicarbonate of soda douches, swinging the pH to the alkaline side and possibly inhibiting the effect of the organisms responsible, may help as much and usually make the patient more comfortable. This should be continued for three weeks and the patient seen again after several days without treatment so as to assess the degree of benefit. More soluble arsenical preparations in the form of vaginal suppositories are now available.

The trichomonas infection has the unpleasant habit of recurrence. It is quite conceivable that it can evade extermination by hiding in the endocervix, and with relapsing cases it is suggested that cauterization of the endocervix, followed by daily packing for a fortnight with paraffin and flavine, may help. In a few isolated cases reinfection from the male is responsible for relapses. Weekly insufflation with silver picrate powder, having first carefully swabbed out the vagina, is widely used, but the results are disappointing.

*Gonorrhæa*.—It may be best that the proved case of gonorrhæa becomes the responsibility of the venereologist and penicillin by injection is the staff of treatment. It has been suggested that the percentage of rapid cures is much lower in the female than in the male. If this be the case, no satisfactory explanation is so far known.

(3) *The simple erosion*.—Under this heading are included all erosions whether congenital or endocrine, in child or adult, but not accompanied by the signs of a chronic cervicitis or proved infection. If the patient is a child or a virgin, examination under anæsthesia is necessary.

The simple erosion responds to cauterization of the eroded area. This can be

# REVISION CORNER

## CERVICITIS

THE patient with cervicitis always complains of vaginal discharge. This discharge is usually described as yellow. Cervicitis, whatever its cause, may sometimes be responsible for pain on intercourse, vague lower abdominal pain, possibly backache, and occasionally intermittent blood-stained discharge. However, by far the most common reason for the patient seeking treatment is this acute or chronic discharge, often responsible for irritation in the external genitals.

### CAUSAL FACTORS

(1) *Childbirth*, with eversion of the lips produced by the unilateral or bilateral tearing of the cervix and exposure of the columnar cells of the endocervix to the acid vaginal secretion (pH between puberty and the menopause ranges from 4 to 5.5). Hypersecretion of the cervical glands follows and in time Nabothian follicles are produced by blocking of the gland ducts. A well-marked hypertrophy of the cervix can occur. It is questioned whether this type of cervicitis is accompanied in the initial stages by a mild infection. Common as is the "chronic cervix" in parous women, whether they report for treatment or not depends upon their fastidiousness as well as the amount of discharge. There is a predisposition to a subsequent carcinoma of the cervix.

(2) *Infection* may produce a cervicitis with the red, weeping, more or less circular, columnar-celled erosion around the external os. The most common infecting organisms are the gonococcus, the trichomona and the coccus; it will be remembered that an enterococcus is usually (? always) found in association with the trichomona and may be the real causal agent.

(3) *Endocrine dysfunction*.—"Over-œstrinization" may produce an erosion, but the practical point is that endocrine therapy is disappointing.

### DIAGNOSIS

Treatment should be preceded by proper investigation. The temptation to prescribe douches of one sort or another without an inspection of the cervix, let alone bacteriological investigation, is responsible for a great deal of disappointment. A careful history in all cases is of fundamental importance. A gonococcal or trichomonal infection may have been superimposed on a chronic lacerated cervix to produce exacerbation of symptoms. When cases suggest infection either by history or by gross appearance of the discharge and of vaginal walls, search should be made for the gonococcus by a gram-stained slide from a platinum loop drop or a swab taken from the endocervix, having first cleaned the vaginal cervix with a saline swab. A urethral specimen should also be examined if possible. The trichomona is demonstrated by immediate microscopic search of a saline-diluted drop. Both investigations should be done, as a mixed infection is fairly common. The chronic trichomonal discharge does not always have a typical frothy appearance. Collaboration between the clinician and the laboratory, preferably with "on the spot" technique, is clearly indicated. Unless a general practitioner is qualified for, and prepared to undertake, bacteriological work, a case suggesting itself as being infective in origin is best sent elsewhere for an exact diagnosis.

### TREATMENT

The simplest way of approaching the question of treatment is to deal in turn with the common forms of cervicitis.

(1) *Treatment of the "chronic cervix"*.—It is futile to dab the eroded vaginal portion of the cervix with a silver stick. A satisfactory result depends upon ten days or more in hospital, treatment starting with a radical cauterization of the endocervix as well as the vaginal cervix. This means an anæsthetic and dilatation

(3) Drugs which stimulate the neuromuscular mechanism of the bowel include the parasympathomimetic substances such as physostigmine, prostigmin, acetylcholine and carbachol. Their main use, however, is in the prevention and treatment of post-operative paralysis of the alimentary tract. Injections of carbachol every four hours for several doses are occasionally useful in the treatment of cases of acute constipation of several days' duration, unaccompanied by signs of intestinal obstruction, in which there has been little or no response to simple or turpentine enemata.

#### CLASSIFICATION AND PREPARATIONS

- (1) The *mechanical stimulants* including cellulose, agar and liquid paraffin.
- (2) The *saline aperients*, which include magnesium and sodium sulphates, and potassium tartrate. Useful preparations are:—

White mixture (*Mistura alba* B.P.)

Seidlitz powder (*Pulvis effervescens composita*, B.P.)

- (3) The *anthracine group*, of which senna, aloes, rhubarb, cascara sagrada and phenolphthalein (synthetic) are common examples. Preparations include:—

Syrup of senna

Compound mixture of senna

Senna pods

Pill aloes, B.P.

Pill aloes and nux vomica, B.P.C.

Alophen pill (aloes, phenolphthalein, strychnine and belladonna)

Compound rhubarb pill, B.P.

Compound rhubarb powder B.P. (Gregory's powder)

Rhubarb and sodium bicarbonate mixture, B.P.C.

Elixir of cascara sagrada, B.P.

Compound mixture of cascara, B.P.C.

Compound cascara pill, B.P.C.

- (4) *Vegetable laxatives*, such as castor oil and figs. Castor oil may be given neat, in capsules or as castor oil mixture, B.P.C. Its taste may to some extent be disguised by adding 60 minims (3.6 c.cm.) of compound tincture of cardamom to each half ounce, by giving it in the form of aromatic castor oil, B.P.C., or by sandwiching the oil between layers of brandy, whisky or lemon juice. Its main use is to evacuate the bowel contents in cases of food poisoning, in which its subsequent slight constipating action is of advantage. Compound syrup of figs is a useful aperient for children.

- (5) The *drastic purgatives* include calomel, jalap, colocynth and croton oil, although the last has no use in modern therapeutics. Large doses of these drugs may produce symptoms of collapse. Preparations which may be required are:—

Compound powder of jalap, B.P. (of value in some cases of heart or renal disease with œdema).

Colocynth and hyoscyamus pill, B.P. (which are sometimes employed to clear the bowel before X-ray examination of the abdominal area and as a pre-operative measure).

#### USES AND ABUSES

Aperients are the most widely used and misused of all drugs, for although a daily action of the bowels is generally desirable it is not always essential for the maintenance of health and comfort, especially in persons of advancing years. They may be used in the following conditions but are not necessarily the ideal treatment for every case:—

- (1) Habitual constipation

- (2) Temporary constipation often associated with an acute illness

- (3) To clear the bowel of an irritant in cases of food poisoning

- (4) To aid the excretion of excessive fluid in some cases of cardiac or renal disease

Habitual constipation is essentially a functional disorder and the aim of treatment should be to rectify the cause rather than to have recourse to aperients. In the absence



carried out by application of the silver stick at weekly intervals, with astringent douches, e.g. alum, between treatments. However, some complain bitterly of pain following this simple treatment. Such patients must have an anæsthetic and the cervix treated with the ordinary post-electric cautery or by diathermy cautery. Dilatation of the cervix is unnecessary. An anæsthetic is not always required with the use of diathermy.

Discussion of the rarer forms of cervicitis is not considered within the scope of this short summary.

W. NETLEY SEARLE, F.R.C.S., F.R.C.S.Ed., M.R.C.O.G.

### LAXATIVES AND APERIENTS

LAXATIVES, aperients or purgatives are drugs which assist the bowel to evacuate its contents. Sometimes these terms are used individually to indicate the potency of their action but this is unnecessary as their effect is largely determined by the dose given, the condition of the intestines, and the idiosyncracies of the patient. Depending upon the preparation and dose used, the action may be mild, producing some increase in peristaltic activity without altering the frequency, appearance or consistency of the stool. In other instances looser and repeated stools may result, whilst drastic purgatives produce frequent, watery motions often accompanied by pain, colic and tenesmus.

*Modes of action.*—The passage of food residue through the bowel is accelerated by:—(1) Increasing the volume of non-absorbable residue; (2) irritating the intestinal mucosa which produces increased peristalsis by reflex action; (3) stimulation of the neuromuscular mechanism.

(1) An increase in the volume of fæcal residue may be obtained by the addition of vegetables, fruit, brown or wholemeal bread and oatmeal to the diet. Further increase will follow the administration of agar, which is a non-irritating and non-absorbable carbohydrate having the property of swelling in the presence of water. The jelly thus formed is of considerably greater bulk than that of the agar administered and causes marked increase in fæcal volume. In this connexion liquid paraffin must be mentioned as a simple unabsorbed lubricant, but when mixed with fæces it not only softens them but also produces a slight increase in their volume.

There are a number of preparations in which agar and paraffin are emulsified together, e.g. petrolagar, which are useful in practice. Phenolphthalein may be added to the emulsion but it should be remembered that this drug is partly absorbed and is excreted in the bile. If taken regularly it may therefore have a cumulative action and produce its purgative effect for several days.

When considering the question of roughage the importance of an adequate fluid intake must not be overlooked.

(2) Irritation of the intestinal mucosa not only produces a reflex increase in peristaltic activity but may also cause an increase in its normal secretions. At the same time the mucous membrane becomes more sensitive to the normal stimulus of distension. Also, the faster rate of progress of the intestinal contents resulting from this allows less time for the absorption of fluid from the gut. It follows that there is an increase in the total bulk of the fæces which further aids peristalsis. Most of the usual aperients act in this way.

Saline aperients, of which magnesium and sodium sulphates are good examples, on the other hand, do not irritate the gut. Being slowly absorbed, they maintain an osmotic pressure within the bowel which prevents fluid absorption. Their main effect is to hasten the passage of the food residue through the small intestine, thus causing fluid distension of the colon and its subsequent reflex contraction. Salines should be given on an empty stomach, e.g., before breakfast, so that the passage into the duodenum is rapid, and they should be diluted with sufficient water to produce an isotonic solution.

such high titre as the routine grouping serum. In this case the agglutinates may not be so marked as to be plainly visible to the naked eye and microscopic examination may reveal unsuspected clumping of the cells. Even if the clumps consist of 4 or 5 cells only, the bloods must be regarded as incompatible and another bottle matched.

This test must be performed routinely even when Group O blood is used universally.

*For emergency use.*—A drip of reconstituted plasma should be set up and while this is running in, the ordinary routine procedures can be set in motion, i.e.:—

- (1) Group the patient.
- (2) Confirm the group of the donor or arrange to obtain blood of the appropriate group from a blood bank.
- (3) With all the bottles which will be required, carry out direct matching of the donor's cells against the patient's serum.

Because of the dangers of the indiscriminate use of the "universal donor" it is advisable to give blood of the patient's own group whenever this can be arranged. Pooled dried plasma has caused several deaths from acute hepatitis and it has been found wiser to limit the amount given to the minimum.

Information on the subject of errors associated with the technique of grouping, discussion of subgroups and agglutinins other than those pertaining to the ABO groups, can be found in the Medical Research Council's War Memorandum No. 9 "The Determination of Blood Groups" (published by H.M. Stationery Office, 1943); "Blood Transfusion" by V. H. Riddell (Oxford, 1939), and "Blood Groups and Transfusions" by A. S. Wiener (Springfield, Illinois, 1943).

JEAN GRANT, M.B., M.R.C.P.ED.

## NOTES AND QUERIES

### *Hormone Therapy in Hirsuties*

QUERY.—I have a patient, aged twenty-four, a young lady who is a professional accompanist, who is greatly troubled by hypertrichosis. Her mother is hirsute, and both her sisters, aged twenty-three and twenty-six, are becoming affected by hirsuties. The hair grows on the face and breasts (round the nipples and between the breasts), the abdominal distribution is definitely male, and there is a thick growth on the inner sides of both thighs, round the anus and on the buttocks. The patient herself is quite feminine in all respects and has well-developed breasts, normal genital organs (external), and normal inclination towards the opposite sex. There is no adiposity, and she enjoys good health. The periods are small in amount and last barely three days with only one "big" day. The trouble started when she was evacuated during the war, when she missed her period altogether for one-and-a-half years. It started again immediately she returned home. Inunction of oestradiol benzoate ointment to the face was tried, and twice weekly intramuscular injections of "menformon" oestrone. She has severe dysmenorrhœa for which benadryl was prescribed. After only two injections the next period arrived (on the correct date) but was

smaller than ever, and she is convinced that there was more hair on the abdomen and a fresh growth between the breasts. The benadryl has no effect on the dysmenorrhœa. I should be most grateful for advice as to further treatment.

REPLY.—The hypertrichosis from which this young lady suffers is almost certainly not endocrine in origin. The family history strongly suggests that it is due to a genetic abnormality. It is extremely common for young girls to suffer prolonged periods of amenorrhœa as a result of sudden changes such as those described. I do not regard a menstrual period lasting only three days as outside the limits of the normal. Oestradiol benzoate is, in my experience, completely useless in the treatment of hypertrichosis, except in those cases which are due to androgenic treatment, when it is often extremely effective. Benadryl in the treatment of dysmenorrhœa has not yet had a very prolonged trial. It apparently is occasionally successful, as are many other methods of treatment. I do not think that it could be responsible for the recent increase in the hair growth. The treatment of dysmenorrhœa is, of course, an extremely difficult thing to write about in the space available. I suggest that the questioner

of organic obstruction the constipation may be due to weakness of the abdominal muscles, deficient roughage or insufficient intake of fluid, diminished reflex activity of the bowel or reflex inhibition from disease of some other abdominal organ (e.g. appendix, gall-bladder or ovary), atonic colon, spastic colon or, most commonly, dyschezia, which is failure to empty the rectum resulting from faulty habits. In this instance correction of the habits, aided by small enemas or glycerin suppositories is indicated, and not the use of aperients. Spastic colon calls for a diminished residue diet aided by abdominal massage, liquid paraffin, belladonna pills and, sometimes, olive oil enemas. An atonic colon requires increased roughage in the diet which may be supplemented by an agar preparation. If stronger aperients are required in chronic constipation, those of the anthracine group may be used.

W. GORDON SEARS, M.D., M.R.C.P.

## PRACTICAL ASPECTS OF BLOOD GROUPING

THE aim of this note is to describe a safe method by which any practitioner can, in an emergency, group a patient and ensure that compatible blood is provided for him; but now that the Blood Transfusion Service is established in Great Britain there should seldom arise an occasion when the practitioner has to tackle such a problem single-handed. It must be emphasized that the directions embody the barest minimum of instruction and that in hospital laboratories more elaborate tests are performed by various techniques.

Two samples of blood are taken from the patient; (1) 1 to 2 drops of blood from a finger prick are allowed to drop into a small test tube containing 1 c.cm. of 3.8 per cent. citrate; (2) 2 to 4 c.cm. of blood from venepuncture are taken into a centrifuge tube or bottle and allowed to clot. From this is obtained the patient's serum for direct matching with the proposed bottle of blood. To avoid multiplicity of samples clotted blood alone may be taken and, after removal of the serum, cells may be obtained from the clot.

### GROUPING OF THE PATIENT

Label a glass slide and place one drop of anti-A grouping serum at the end marked A and one drop of anti-B serum at the end marked B. Now to the drop at each end add one drop of the patient's cells and citrate mixture, cover to prevent evaporation and leave for five minutes. Agglutination will become visible sooner if the slide is gently rocked from side to side. Normally the agglutinates are visible to the naked eye if viewed against a white background; they are about the size of grains of cayenne pepper, but sometimes it is necessary to check a doubtful result by microscopic examination.

RESULTS	
<i>Anti-B serum</i>	<i>Anti-A serum</i>
No agglutination	No agglutination = Group O
No agglutination	Agglutination = Group A
Agglutination	No agglutination = Group B
Agglutination	Agglutination = Group AB

### DIRECT MATCHING OF PATIENT'S SERUM WITH CELLS FROM DONOR

This test *must* be performed *every time* a bottle of blood is given to a patient. Using aseptic precautions the cap is removed from the blood bottle. A sterile Pasteur pipette is lowered into the cell layer and one or two drops of cells are aspirated and dropped into a small test tube containing 1 c.cm. of 3.8 per cent. citrate, as for collection of patient's cells. Flame the top of the blood bottle and the cap and close the bottle. Once the blood bottle has been opened it must be used within twenty-four hours even if kept in a refrigerator.

On a slide put 1 drop of the cell and citrate mixture and 2 drops of the patient's serum obtained from specimen 2 (above). Cover to prevent evaporation and leave for 20 minutes, since usually the patient's serum does not contain agglutinins of

## PRACTICAL NOTES

### *A New Treatment of Burns*

ON the theory that animal tissues might provide a suitable and effective substance which would form a more physiological eschar than tanning agents such as tannic acid, C. H. Chase (*Surgery, Gynecology and Obstetrics*, September 1947, 85, 308) has investigated the use of an extract made from beef aorta. The extract is made as follows:—

The beef aorta is ground and then washed to remove the excess blood. The washed material is then extracted with one-tenth normal sodium hydroxide solution for one hour and filtered. The filtrate is reduced to a pH of approximately 4.2 by the addition of dilute hydrochloric acid and the precipitate thus formed is then recovered by filtration. This product may then be redissolved in a physiological solution of sodium chloride and used as a spray, or it can be worked into a paste or ointment containing sulphathiazole, sodium 2-hydroxydiphenyl glycerol and diglycol stearate.

The extract has been used in over 500 ambulatory patients with burns, and the results are summarized as follows:—It forms a dry, slightly flexible eschar over denuded areas of skin. There has been no evidence of it retarding tissue growth. It adheres to the burned skin surface and remains dry until the wound has healed or the slough begins to liquefy. The eschar separates readily when infection or epithelization occurs. The extract rapidly relieves pain when applied to first, second or third degree burns. It has also been found of value in dealing with the early vesicles of herpes simplex; it adheres to the small vesicles which usually desquamate in twenty-four hours, leaving a smooth but erythematous area. It also relieves the pain of an erythema resulting from sunlight or ultra-violet light.

### *Prolapsed Discs and Sciatica*

IN an analysis of 305 cases of sciatica, D. Kendall (*Quarterly Journal of Medicine*, July 1947, 16, 157) reports that in 163 (53 per cent.) the primary diagnosis was prolapsed intervertebral disc, whilst in 110 (36 per cent.) a primary diagnosis of inflammation or disease of muscular or fascial structures was made. The remainder were either psychological in origin or due to a miscellaneous set of conditions such as osteoarthritis of the hip, spondylolisthesis, and so forth. Trauma and exposure to cold were the only two important etiological factors, but in the group due to myofascial causes the "rheumatic" predisposition also played a part. Two types of trauma were found to be responsible for the condition: a single severe injury due to a fall from a height on to the feet or buttocks with the spine flexed, and repeated minor injuries, such as by lifting of heavy weights. The differentia-

tion of the early case of prolapsed disc from the myofascial case was often difficult, but the abolition of symptoms and signs following the injection of procaine into the painful area in the myofascial case was found to be a useful diagnostic point. No patient in this series was treated surgically if the attack was of less than four months' duration, and even then operation was only considered if medical treatment had failed or if relapse had occurred upon resuming normal activity. In cases in which there was a history of frequent recurrences over a period of years, operation was undertaken if there was no response to three weeks' medical treatment. Medical treatment consisted essentially of rest in bed, with mild analgesics and the local application of heat in the early stages, followed by graduated exercises when the symptoms began to subside. The average duration of stay in hospital for patients successfully treated by this method was eight weeks. Immobilization, either by means of a plaster bed or a plaster jacket, was found to be of no value, and indeed to have certain disadvantages. The position with regard to treatment is summed up as follows: "A comparison of the results of conservative and operative treatment of intervertebral disc prolapse leads to the suggestion that caution should be exercised in recommending the latter course. In addition there is reason to believe that sciatica, with the exception of the symptomatic variety, is a self-limiting disease, and that operation is practically speaking only a short cut in an otherwise tediously protracted disease".

### *Clinical Features of Coarctation of the Aorta*

IN an analysis of 26 cases of coarctation of the aorta, Crighton Bramwell (*British Heart Journal*, April 1947, 9, 100) draws attention to the fact that this condition is liable to be missed unless the possibility of its presence is always borne in mind. The ages of his patients when first seen ranged from nine to fifty-eight years, but only three of them were children. Many patients with coarctation of the aorta have no symptoms attributable to their condition. Thus, nine of the 23 patients in this series who were followed up, were symptom-free, and in another three symptoms did not appear until after the age of forty-five years. Symptoms often first appear following an intercurrent infection or physical strain. The most common symptoms are dyspnoea, palpitation and fatigue. In four cases pain in the trunk or arms was the presenting feature, and it is suggested that this may be due

should read the sections on this subject in "Female Endocrinology," by Jacob Hoffman (Saunders, 1944), where various hypotheses and treatments are discussed.

RAYMOND GREENE, D.M., M.R.C.P.

### *Lymphangitis of the Nose*

QUERY.—A patient of mine frequently suffers from lymphangitis of the bulbar portion of the nose. It seems to arise from an infection caused by an irritation or from microscopic cracks at the margins of the nostrils. I have tried various ointments, penicillin and others, and find that daily application of dilute yellow mercuric oxide ointment is the best to keep it at bay. The patient's age is sixty-eight, general health good; he has given up tobacco as smoke made the nose worse.

REPLY.—This condition is probably due to a mild streptococcal infection. The organism gains entry through a minute break in the skin at the edge of the nostrils. If a fissure is obvious, a reasonable treatment would be to paint this with 10 per cent. chromic acid solution on a wooden applicator, but care should be taken not to repeat this without an interval of at least one week between the applications. Superficial X-ray treatment may cause a complete disappearance of the inflammatory process. A further local remedy which has been successful in the past is a proprietary preparation "anti-peol." An examination of the nose by a specialist should be considered.

R. M. BOLAM, M.D.

### *The Treatment of Ankylosing Spondylitis*

QUERY (from Siam).—Can you inform me if there is any form of treatment for a case of spondylitis ankylopoetica. My patient, aged thirty-three, a male carpenter, married, suffered from stiffness of the back and pain in both shoulder joints for two years; he could not bend his back. The condition did not subside after various forms of treatment. I enclose an X-ray of the spine which shows extensive new bone formation over the edge of the lower thoracic and upper lumbar spines.

REPLY.—Deep X-ray therapy is the only form of treatment which is effective in relieving pain in the active stages of ankylosing spondylitis. Finzi states that the best results are obtained by the use of small doses, and advises 70 r at 60 or 70 centimetres F.S.D. on the surface, repeated every five days. Relief is frequently obtained remarkably quickly, and there may also be some increase in the range of movement in those cases in which joint stiffness is due to muscle spasm. When ossification of the affected spinal segment is complete the quiescent stage is entered and

pain usually subsides. The process of ankylosis is, however, progressive, beginning in the lumbosacral region and passing upwards, and it is common to find evidence of active disease producing pain in the thoracic or cervical spine when the lumbar spine is ankylosed and painless.

The X-ray film submitted shows evidence of long-standing disease leading to an extensive bony ankylosis of the lumbar spine, which should now be painless. The patient's symptoms may be due to active disease in the upper thoracic and cervical spine or shoulders, and deep X-ray therapy to these areas should be tried. External support by means of a plaster jacket and spinal braces is useful throughout all stages of treatment, particularly when there is any evidence of the development of flexion deformity, or symptoms of chronic strain associated with a postural defect.

J. S. BATCHELOR, F.R.C.S.

### *Dietetic Difficulties in Children*

QUERY.—I recently came across a girl aged six years, who since birth has persistently refused to eat meat and meat products, eggs and fish. I have heard of similar cases. What is the most suitable type of diet for these children? Are they regarded as a distinct type or class by medical men or anthropologists? If so, has any specific or distinguishing psychological development been noted?

REPLY.—There is no evidence that these children are of any distinct type. Faulty eating habits are invariably the result of unwise management by parent or nurse, inducing a sense of conflict in the child. Refusal to eat certain articles of diet may often be traced to an incident of forcing food when the child was unwell. Many parents fail to realize that children may have a variable appetite even in health, and by insistence create an attitude of negativism and a deep-rooted dislike of the article of food concerned. The problem should not be discussed in front of the child and should never be allowed to precipitate a scene at meal times. Articles of diet which the child likes should be offered so far as possible, but should be shared by the whole family and never pressed. The protein content of soups, pastry, puddings and other dishes can be reinforced by the use of milk, milk powder, cheese, soya flour, and eggs introduced into the diet in cakes, custards, and the like. When the child is old enough to learn something about food values and cooking it should be possible with her cooperation to re-educate her palate, starting with minimal quantities of the food previously refused.

MARGARET BABER, M.D., M.R.C.P.

### *Vitamins and Peptic Ulcers*

No evidence could be found by D. Cayer and S. Cody (*Gastroenterology*, July 1947, 9, 54) to support the hypothesis that as a group patients with peptic ulcer have deficiencies of vitamin A, niacin, or riboflavin. Estimations of vitamin levels in the blood and urine were made in two groups of patients: 20 with active peptic ulcer, and 15 with no evidence of gastro-intestinal or organic disease. All patients in both groups were in hospital during the period of observation and received a diet containing 1,800 to 2000 calories: 60 to 70 gm. of protein, 80 gm. of fat and 200 gm. of carbohydrate. This diet was estimated to contain 5,500 international units of vitamin A, 75 mgm. of vitamin C, 2.9 mgm. of riboflavin, and 12.7 mgm. of niacin. Plasma levels of vitamin A in both groups were found to be well within normal limits. No significant difference in the niacinamide excretion levels were found in the two groups, and excretion levels of riboflavin were within normal limits in both groups. In patients with active peptic ulcer the plasma ascorbic acid content showed both a low initial level and a flat curve following a 1 gm. test dose. It is concluded that "there is little to suggest that an underlying or preceding deficiency of vitamin A, C, niacin, or riboflavin is an etiologic factor in the development of peptic ulcer. The need for the routine administration of these substances to persons having active peptic ulcer is doubtful".

### *The Excretion of Drugs in Human Milk*

The following points are culled from a review by N. Sapeika (*Journal of Obstetrics and Gynecology of the British Empire*, August 1947, 54, 426) of the literature concerning the excretion of drugs in human milk.

**Alcohol.**—The milk may contain a small amount of alcohol if large quantities are consumed, but not with ordinary doses.

**Chloroform.**—One case has been recorded of a new-born child, whose mother had been given chloroform for after-pains, who stopped suckling while on the breast and remained in a deep sleep for eight hours.

**Barbiturates.**—Excretion of barbiturate into breast milk has been demonstrated, but the amount is generally too small to affect the infant.

**Chloretone.**—This drug is only found in the milk after continuous administration of very large doses.

**Bronides** are well known as a possible cause of a skin eruption in infants, and the amount excreted in the milk may have a sedative effect on the infant.

**Morphine and codeine.**—These have never

been demonstrated in human milk.

**Atropine.**—"It is well known that belladonna or its alkaloid atropine markedly diminish the milk flow, and the drug transmitted through the milk may affect the child".

**Hyoscine.**—Only minute traces appear in the milk.

**Nicotine** can regularly be demonstrated in the milk of nursing mothers who smoke, but opinion differs as to the effect of this on the child. The general consensus of opinion, however, appears to be that this does little harm to the child.

**Phenolphthalein.**—No obvious effect on bowel movements has been demonstrated in the infants of mothers taking phenolphthalein.

**Emodin.**—This is the active constituent of senna, cascara, rhubarb and aloes. A certain amount may be absorbed and may produce a purgative action in the infant.

**Sulphonamides.**—Both sulphanilamide and sulphathiazole have been demonstrated in the milk of nursing mothers and traces of the drug have been found in the blood and urine of the infant.

**Penicillin.**—Small amounts have been found in the milk following the intramuscular injection of 100,000 units.

**Mandelic acid.**—Small amounts are excreted in the milk, but never sufficient to be dangerous to the child.

**Arsphenamine** is not excreted in the milk.

**Iodide.**—Only small amounts are found in the milk.

**Salicylic acid** has been detected in the milk after 10 grains (0.65 gm.) of sodium salicylate.

**Ergot alkaloids.**—Signs of intoxication have been recorded in infants while the mother has been receiving ergot alkaloids.

**Caffeine.**—This has been found in the milk following the drinking of both tea and coffee.

**Carotene.**—A case has been reported of carotenderma in a mother and child while the mother was taking several carrots daily.

**A Simple Treatment for Senile Warts**  
According to D. McLellan (*Canadian Medical Association Journal*, September 1947, 57, 292) zinc oxide adhesive plaster is a most effective method of removing senile warts. He first noted this in an elderly patient with a fractured rib, who had multiple senile warts on the chest, back and abdomen. There were so many that it was impracticable to cover each with a protective dressing, and it was therefore decided to put the adhesive plaster directly on to them. Five weeks later when the plaster was removed the warts were stuck to the plaster and the skin was clean. Subsequently the same treatment has been used in several other cases with the same result in each case.

to pressure on nerves of the dilated arteries of the collateral circulation. The classical signs are high arterial pressure in the upper limbs with a lower pressure in the lower limbs, pulsating arteries in the back and front of the chest, and notching of the ribs detectable on radiological examination. To these Bramwell adds two further signs of importance: excessive arterial pulsation at the root of the neck, and a systolic murmur with a distribution which does not conform to that of the common valvular and congenital lesions, e.g., it may be loudest in the interscapular region. Prognosis is most uncertain, because fatal complications are liable to develop unexpectedly. The third decade of life is the most hazardous, and Bramwell reports that patients whose symptoms date from childhood are unlikely to reach the age of thirty years. In those who are free from symptoms until this age the outlook is much more favourable. Of the 10 fatal cases in his series, four died of congestive heart failure, two of subacute bacterial endocarditis, and one each of septicaemia, subarachnoid haemorrhage, carcinoma of the stomach, and lobar pneumonia. Women with coarctation of the aorta should be delivered by Caesarean section, as grave complications are liable to develop during the second stage of labour. Severe physical strain is also liable to produce sudden death, even in patients with good exercise tolerance, and therefore physical exertion should always be limited in such patients.

### *A New Method of Slowing Penicillin Excretion*

MUCH work has been done in an attempt to find a method of enhancing the efficiency of the oral administration of penicillin. The latest to be reported is a new drug known as caronamide (4'-carboxyphenylmethanesulfonamide) which is claimed by J. W. Crosson *et al.* (*Journal of the American Medical Association*, August 30, 1947, 134, 1528) to be "an orally effective compound of low toxicity, capable of producing a reversible inhibition of penicillin excretion by the renal tubules", and thereby resulting "in an elevation of the concentration of penicillin in the plasma". In six patients who were given 100,000 units of penicillin by mouth every four hours, the simultaneous oral administration of 2 gm. of caronamide resulted in an increase of penicillin blood levels of from two to seven times. Eight patients were given penicillin intramuscularly, and either 1.5 gm. of caronamide three-hourly or 2 gm. four-hourly, with the same result, but in three patients who received 1 gm. every two hours there was practically no

increase in the blood concentration of penicillin. The results in three patients receiving penicillin in beeswax and oil were less impressive, but it suggested that this may be due to inappropriate timing for collection of blood samples. No toxic effects were observed. Caronamide is not yet available in this country.

### *Penicillin in the Treatment of Syphilis of Pregnancy*

A COMPARISON of the relative value of aqueous solutions and oily suspensions of penicillin in the treatment of syphilis in pregnancy is provided by N. R. Ingraham *et al.* (*Journal of Venereal Disease Information*, August 1947, 28, 155). In aqueous solution penicillin was given at three- to four-hourly intervals over a period of eight to ten days, to a total dosage of 1.2 to 2.4 million Oxford units. As oily suspension, a total dose of 4.8 million Oxford units of amorphous calcium penicillin in peanut oil-beeswax was given intramuscularly over a period of nine days as follows: a single injection of 150,000 units on the first day, of 450,000 units on the second day, and of 600,000 units on each of the following seven days. Ninety-two mothers, mostly Negroes, received the aqueous solution and they have been followed for periods ranging from six months to over two years after treatment. The number of clinical relapses in this group was 5.4 per cent. There were only two syphilitic infants among the 89 living infants born to these mothers, i.e., an incidence of 97.8 per cent. normal children from syphilitic mothers. Among the 45 mothers, again mostly Negroes, treated with the oily suspension there were two who relapsed, and there were two syphilitic infants among the 41 living infants born to the mothers in this group, i.e., a failure rate of 4.9 per cent. The rate of infection of the foetus appeared to increase in proportion to the early symptomatic activity of the disease in the mother. It is concluded that the oily suspension is a satisfactory substitute for the aqueous solution of penicillin "when hospitalization is not possible or when treating latent stages of the disease", but that the "best results for symptomatic early syphilis in late pregnancy are obtained through hospitalization and use of aqueous sodium penicillin". When aqueous sodium penicillin is used it is recommended that to ensure cure of the mother a minimum total dose of 2.4 million units should be given. "Maximal rather than minimal therapy is desirable for both mother and infant, should any question arise as to what treatment course to employ".

posterior urethra and for total prostatectomy in carcinoma, in addition to the varying benign pathological conditions which are responsible for obstruction at the bladder neck. In the female, he uses this route for the operative treatment of stress incontinence, achieving an elevation of the bladder neck by tying fascial straps from the rectus sheath round the urethra. All surgeons who essay these operations should have this book; so also should their registrars and house surgeons, who will find useful information in the chapters dealing with pre-operative and post-operative care and post-operative complications. The production is excellent, but less space might be devoted to illustrations of temperature charts.

*Mongolism and Cretinism: A Study of the Clinical Manifestations and the general Pathology of Pituitary and Thyroid deficiency.* By CLENIENS E. BENDA, M.D. London: William Heinemann (Medical Books) Ltd., 1947. Pp. xv and 310. Figures 103. Price 25s.

THIS book is primarily a study of mongolism, with cretinism used largely to bring out the high lights. The author justifies this when he points out that whereas much is known and written about cretinism, little serious work has been done on mongolism. Dr. Benda has done much to rectify this and his book contains a great deal of carefully collected information, and records the results of an extensive investigation. There is a useful table giving body measurements and weight in 120 cases, and other tables show values for the B.M.R. and various haematological and biochemical data done on a fair number of cases. The chapters on pathology and endocrine relationship are of considerable interest and evidence is produced to show that mongolism is due to a congenital type of hypopituitarism and that the pathological lesions in the brain are compatible with a chronic deficiency of sugar metabolism or of oxygenation. An intriguing effort is made at prevention by endeavouring to establish means of suspecting that a given pregnancy will result in a mongoloid child. Although the subject may appear a limited one, its treatment should give to this book a wide appeal, as there are sections of special interest to the endocrinologist and pathologist as well as to the paediatrician and those concerned with mental deficiency.

#### NEW EDITIONS

*Common Skin Diseases*, by A. C. Roxburgh, M.D., F.R.C.P., in its eighth edition (H. K. Lewis & Co. Ltd., 21s.) has been extensively revised, largely for the inclusion of penicillin, which

plays an important part in many dermatological conditions. There are new sections on the use of calciferol in the treatment of lupus vulgaris, and on DDT, particularly in pediculosis; and paragraphs dealing with adenoma sebaceum, infective eczematoid dermatitis, and a number of other conditions of recent recognition. The new edition is well produced and richly illustrated.

THOROUGH revision has been carried out in the preparation of the twelfth edition of *Recent Advances in Medicine*, by G. E. Beaumont, D.M., F.R.C.P., D.P.H., and E. C. Dodds, M.V.O., M.D., F.R.C.P., F.R.S. (J. & A. Churchill Ltd., 21s.). The new additions are many—too many to enumerate—but mention may be made of those on infective hepatitis, atypical pneumonia, thiouracil therapy, and a complete chapter devoted to the antibiotics. Another interesting new section is that dealing with the use of the urinary hormones for diagnostic purposes.

*An Introduction to Dermatology*, by G. H. Percival, M.D., Ph.D., F.R.C.P.Ed., D.P.H., in its eleventh edition (E. & S. Livingstone Ltd., 35s.) has been entirely rewritten, whilst maintaining the original aims of Sir Norman Walker, the original author. Among the advances in dermatology since the appearance of the previous edition in 1939, penicillin and the sulphonamides occupy an important place. The use of plasmoquin in the treatment of lupus erythematosus, DDT in pediculosis capitis, the treatment of industrial dermatoses and occupational cancer are among the many new additions to this well-known textbook of dermatology.

*Ellis's Anatomy*, revised and edited by J. A. Keen, M.B., F.R.C.S., in its thirteenth edition (Stewart Printing Co. (Lty.) Ltd.: John Murray, 42s.) will be warmly welcomed by medical students. The work is too well known to call for detailed description, but the introduction of a new dissection plan which provides for the dissection of the whole body during the course of a year, and which has been proved satisfactory by a three years' trial, calls for special mention. The illustrations, which total 216, are beautifully produced.

*Surgical Applied Anatomy*, by Sir Frederick Treves, Bart., revised by Lambert Rogers, M.Sc., F.R.C.S., in its eleventh edition (Cassell and Co. Ltd., 20s.) has been subjected to radical revision. This work fills a special niche in the surgeon's armamentarium, and the new edition, which is richly illustrated, will be welcomed by students and practitioners alike.



## REVIEWS OF BOOKS

*British Surgical Practice. Vol. I.* Edited by SIR ERNEST ROCK CARLING, F.R.C.P., F.R.C.S., and J. PATERSON ROSS, M.S., F.R.C.S. London: Butterworth & Co. (Publishers) Ltd., 1947. Pp. xxxi and 486. Figures 228 and 2 plates. Price 60s.

THIS is the first volume of a new work which will appear in eight volumes and an index volume. The editors have set themselves a task, never attempted before, that of providing a reference book that will give the practical surgeon authoritative information on every aspect of surgical treatment. The work is thus more than an encyclopædia of operative surgery. Surgical pathology and clinical surgery are discussed in so far as they point the way to treatment, and articles on anatomy, physiology and medicine are introduced where they have a practical bearing on the subject under discussion. Operative surgery naturally occupies the largest place, but the editors have chosen the plan of asking acknowledged experts to describe the methods they have found satisfactory, in preference to that of offering the reader a large selection of alternatives with no opinion as to their relative value. They have taken a bold step in planning an alphabetical arrangement of subjects—a method that might be thought to imply endless duplication (abscess for instance, occurring in every organ and system in the body) but one the wisdom of which seems to be completely vindicated by its success in this volume. "Abscess" and "abdominal emergencies" are treated on general lines by a pathologist and a surgeon, but both are considered later in particular relation to "acute appendicitis". Some subjects, such as achlorhydria, after-care, appetite, allergy, anxiety states, artificial pneumothorax and asymmetry, on all of which the postgraduate reader requires to be informed, would hardly have been included under any other system. It is difficult in the space of a review to pick out particular articles for comment: John Morley's chapter on the abdominal emergencies is a scholarly and helpful essay; Archibald Marston contributes a chapter on general anaesthesia that could not possibly be improved upon; Zachary Cope on actinomycosis and Stanford Cade on angioma are at their best; George Perkins gives an admirable summary of the surgery of amputations, which includes a discussion of the merits of certain operations, such as the Syme, of which Roehampton does not approve, and detailed advice on the technique of a typical amputation; Professor Learmonth contributes a chapter on the surgery of the arteries, with well-illustrated

descriptions of the lesser known methods of approach to the deeper arteries as planned by Fiolle and Delmas. The production is excellent. The volume is a handy size, and stoutly bound; the illustrations are well chosen and well reproduced. "British Surgical Practice" fills a hiatus in surgical literature, which may not have been apparent before, but which clearly lay there awaiting just such a work.

*Diseases of the Chest.* BY ELI H. RUBIN, M.D., F.A.C.P., F.C.C.P. London: W. B. Saunders Co., 1947. Pp. xii and 685. Figures 355. Price 60s.

TWO features characterize this comprehensive treatise: the emphasis upon X-ray diagnosis, and the inclusion of a section on the principles of surgical treatment. Of the comprehensiveness of the work there can be little doubt. An introductory section on diagnosis is followed by sections on acute and chronic pneumonias, pulmonary tuberculosis, diseases of the lungs and bronchi, diseases of the mediastinum, diaphragm and pleura. The whole is rounded off by a section of 50 pages on the principles of surgical treatment by Dr. Morris Rubin. A point stressed by the author is that extensive use is made of case records to illustrate the more salient features of each condition. Whether or not this is a wise practice is debatable, and certainly some of the case records could be well omitted. The standard of reproduction of the many X-rays is pleasingly high and adds considerably to the value of a book which post-graduates in particular will find well worth careful study. Specialists in diseases of the chest will also find it a useful work of reference, especially as each section has an extensive bibliography.

*Retropubic Urinary Surgery.* BY TERENCE MILLIN, M.Ch., F.R.C.S., F.R.C.S.I. Edinburgh: E. & S. Livingstone Ltd., 1947. Pp. vii and 206. Figures 163. Price 25s.

THIS monograph is chiefly concerned with the author's method of dealing with prostatic obstruction by the extravesical retropubic approach, a procedure which has aroused great interest since the technique was first described nearly two years ago. Details of the operation are precisely outlined, the various steps being clearly demonstrated by many useful semi-diagrammatic illustrations. Millin has extended the scope of the retropubic approach and describes its application in the repair of injuries to the

## THE PRESENT STATUS OF TONSILLECTOMY

By W. A. MILL, M.S., F.R.C.S.

*Surgeon, Ear, Nose and Throat Department, St. Thomas's Hospital.*

THE operation of tonsillectomy is rightly regarded as a valuable procedure in the right case. The indications for the operation have, in recent years, received a great deal of attention and many have questioned whether the operation, particularly in children, was not being performed too readily and all too often. Some have been inclined to hold that tonsillectomy is almost a panacea for the diseases of childhood: others have thought that benefit has resulted only in the occasional and well-selected case. Glover (1938) described the rise in the incidence of tonsillectomy as one of the major phenomena of modern surgery. He stated that the estimated number of tonsil operations performed annually in this country was 200,000. In 1931 more than 33 per cent. of London elementary school children had actually undergone the operation.

### THE PRESENT INCIDENCE OF TONSILLECTOMY

For a variety of reasons the number of tonsillectomies done at the present time is certainly much smaller. In the decade before the recent war children were often operated on as out-patients, so that they returned to their homes later on the day of operation. This practice has been given up, and children are now operated on as in-patients. The shortage of hospital accommodation during, and since, the war and the present shortage of nurses have contributed to lessen the incidence of the operation as, indeed, war-time evacuation schemes must have done.

*Children.*—Before the recent war there had grown up in many mothers a belief that the removal of the tonsils and adenoids was a thing that most children should at some time undergo, and that great benefit almost always resulted from the operation. This belief still persists to some extent; considerable parental pressure is at times brought to bear upon both the family doctor and the specialist if the mother thinks that operation would be the means of reducing the frequency of some of her child's minor ailments. At the present time, in the face of medical and some lay criticism, the

# NOTES AND PREPARATIONS

## NEW PREPARATIONS

"ANTHISAN" brand pyranisamine maleate is an antihistamine substance stated to be of low toxicity. Encouraging reports have been published of its value in the treatment of allergic conditions, such as hay fever, serum sickness and allergic conditions of the skin. Anthisan is issued in tablets of 0.1 gm., in containers of 25 and 500, and in ampoules of 2 c.cm., in boxes of 10 and 50. The manufacturers are May & Baker Ltd., Dagenham, Essex, from whom further particulars can be obtained.

BAL (dimercaptopropanol), which was produced during the war as an antidote for poisoning by arsenical war gases, has since been shown clinically to be of value in the treatment of arsenical, mercury and gold poisoning. "Injection of BAL" is supplied for intramuscular injection as a 5 per cent. solution in oil with 10 per cent. benzyl benzoate, in ampoules of 2 c.cm., in boxes of 12, price 16s. 8d. (subject to professional discount) by Boots Pure Drug Co., Ltd., Station Street, Nottingham, from whom literature can be obtained.

CROOKES HALIBUT OIL EMULSION FOR INFANTS is a concentrated emulsion of reinforced Crookes halibut oil which is claimed to be completely and readily miscible in milk, and therefore to be of value in supplementing the diet of the bottle-fed infant with a vitamin A and D preparation. It is issued in vials of 15 c.cm., the suggested dose being 3 drops in each of four feeds daily, thereby supplying 3000 I.U. vitamin A and 800 I.U. vitamin D. The manufacturers are the Crookes Laboratories Ltd., Park Royal, London, N.W.10.

## ROYAL MEDICAL BENEVOLENT FUND "CHRISTMAS GIFTS"

SIR ALFRED WEBB-JOHNSON, Bt., K.C.V.O., D.S.O., P.R.C.S., President of the Royal Medical Benevolent Fund, writes in his Christmas appeal letter:—

"Christmas comes but once a year. I therefore appeal to the medical profession to help those who have to look to others for whatever extra comforts may come their way. The beneficiaries of the Royal Medical Benevolent Fund are either aged or infirm practitioners, their wives, widows or children, and but for the grace of God any one of us, or our families, might be in like need. I hope subscribers to the Fund will send an extra donation to make this Christmas a little less bleak and grim. I earnestly ask those who are not subscribers to show their sympathy for their less fortunate colleagues, not only by sending Christmas gifts, but by becoming regular supporters of the Fund".

Contributions and subscriptions should be sent to the Secretary of the Royal Medical Benevolent Fund, 1 Balliol House, Manor Fields, Putney, London, S.W.15, and marked "Christmas Gifts".

## LONDON MEDICAL EXHIBITION

THE thirtieth annual London Medical Exhibition will open on Monday, November 17, at the New Hall of the Royal Horticultural Society, Greycoat Street, Westminster, S.W.1, and will remain open from 11 a.m. to 6.30 p.m. daily until Friday, November 21. Admission is confined to members of the medical and dental professions, and invitations are issued by the organizers, the British and Colonial Druggists' Ltd., 194-200 Bishopsgate, E.C.2. Those not receiving invitations should apply to the organizers, or present their professional cards at the entrance to the Hall.

## PENICILLIN

THE Ministry of Health draws attention to the fact that the distributors of penicillin have reported difficulty in filling orders from hospitals, owing to the particular vial sizes requested not being available. It is therefore asked that hospitals and other users shall, when possible, accept the vial sizes immediately available. Only a small proportion of penicillin now produced in the United Kingdom is crystalline or white. The crystalline form need only be used when intrathecal, ventricular or subconjunctival administration is necessary: in most other conditions yellow penicillin as produced to-day is equally effective.

## PUBLICATIONS

*Excerpta Medica* is the title of a monthly abstract service of world medical literature, comprising fifteen sections and covering the whole field of theoretical and clinical medicine, which is now appearing under the general editorship of Professor M. W. Woerdemen of Amsterdam. The Board of Editors includes many well-known names on the Continent, in the U.S.A. and Great Britain. The first sections have already been published and it is hoped that all sections will have begun publication before the early summer of 1948. Further details can be obtained from the British agents, E. & S. Livingstone Ltd., 16/17 Teviot Place, Edinburgh, 1.

*The History of Duncan, Flockhart & Co.*, which has been compiled to commemorate the centenary of ether and chloroform, gives a short history of the development of this well-known firm of manufacturing chemists, which has played such a vital part in the production of anaesthetics, from the time of its inception by John Duncan in 1806 to the present day. Copies of this attractive production are available on request to Duncan, Flockhart & Co., 155/57 Farringdon Road, London, E.C.1.

The contents of the December issue, which will contain a symposium on "Diseases of the Throat", will be found on page lxxix at the end of the advertisement section.

therapy: so far the results are said to be promising. The improvement is thought to be due, not to the reduction in the amount of lymphoid tissue, but to the clearing up of the infection present. Time will show whether this treatment will in any way replace the operative removal of tonsils and adenoids.

#### PRECAUTIONS IN OPERATING

The operation is deliberately undertaken at a time when complications as a result of it will be unlikely to occur. No operation should be done in the presence of acute local or general infection unless this is unavoidable. Care should be taken to see that the patient is apyrexial before operation: no operation should be done within four weeks of an attack of inflammation of the upper respiratory passages. When operation is undertaken for some systemic disorder it is important that the right time for operation be chosen, with, if possible, the condition quiescent, the patient suitably rested both before and after operation, and under adequate administration of the sulphonamides or penicillin. In this way, at the present time, it is possible to a great extent to guard against the danger of the operation having a deleterious effect.

#### THE CHOICE OF CASES FOR OPERATION

Most authorities agree that tonsillectomy should not be done in the very young child. Glover (1938) found that the incidence of operation was highest between the ages of five and seven years. This he thought was "due to many operations being performed on the tonsils for enlargements which are either (a) physiological—associated with the great changes in development and in the oral cavity which take place at this critical period; or (b) immunological—in response to the unaccustomed herd infections of the new environment of school, or to the sepsis sometimes resulting from the decay of the primary dentition".

*Careful diagnosis.*—In deciding whether or not the operative removal of the tonsils and adenoids should be carried out, not only must a clinical assessment of the local condition be made but due weight must be given to the history and to the findings of a general examination. Some diminution in the frequency of operation in recent years is no doubt due to better diagnosis. Careful questioning will reveal many "colds" to be attacks of allergic rhinorrhœa; the pale "allergic" nasal mucosa will often be recognized, and in such cases, which do not benefit by the operation (unless there are other indications), a family history of allergic troubles will often be found. Sinusitis is common in children: a large mass of adenoids may be present and may require removal in these cases, but it is important to avoid operations on patients in whom the sinusitis is unrecognized, as little benefit will, as a rule, result. It is now much more easy with modern X-ray methods to make the diagnosis of sinusitis than was formerly the case.

question of operation is probably much more carefully considered than was the case twenty years or so ago. The most exact diagnosis and assessment of the local and general features of a case must always be made. There is nowadays a greater tendency when there is a doubt to defer operation until it has been seen whether general treatment and a seaside or country holiday, with plenty of fresh air, will bring about sufficient improvement in the child's condition.

*Adults.*—In the case of adults one of the common indications for operation is for the elimination of focal sepsis. For many conditions the operation is still advised, but it must be admitted that the results of operation have often been disappointing and a more critical attitude has been adopted towards the whole question of focal sepsis. Reiman and Havens (1940), in a review of the case against the routine extraction of teeth and tonsillectomy in the treatment of systemic disease, claim to show that the experience of twenty-five years has not justified the practice in the minds of many who have given careful thought to the matter.

#### THE PRESENT-DAY OPERATION

Tonsillectomy is now almost always carried out by the operation of dissection—the guillotine operation has been largely abandoned. Local anæsthesia is largely used in America, but in this country general anæsthesia is favoured and, in the case of adults, intratracheal anæsthesia of nitrous oxide and oxygen. The depth of anæsthesia is readily controllable and at the end of the operation, when the patient is allowed to become "light", the bleeding points may be readily found and ligatured. Because of this, post-operative reactionary hæmorrhage is much less common than was formerly the case, and the incidence of lung abscess and chest complications has been very much reduced. The whole tonsil is enucleated and tonsil remnants are not left to cause trouble later on, as they often were after the guillotine operation. The removal of adenoids is much more satisfactory and complete when the patient is well anæsthetized. Although adenoids may grow again after removal there is less likelihood of this happening if removal has been complete. With the sulphonamides and penicillin now available for treatment the complications of the operation are now much less worrying than was formerly the case. The "smash-and-grab" guillotine operation and the hurried scrape for adenoids in children rapidly coming round from the anæsthetic certainly helped to give the operation a bad name because so often, even in expert hands, the removal of both tonsils and adenoids was incomplete.

*Other methods.*—It may be mentioned here that the removal of tonsils by repeated diathermatization and by the application of caustic pastes (such as "London paste") has been found to be unsatisfactory and both methods have been abandoned. In the United States, in recent years, there has been some treatment of enlarged tonsils and adenoids in children by deep X-ray

if the tonsils demand removal is this done, and here again it must be emphasized that parental pressure must sometimes be resisted.

*Colds.*—Children are often referred for operation because they suffer from frequent colds, particularly winter colds. The results of operation have often been disappointing. Kaiser (1932) says that to “assume that the tonsils and adenoids are responsible in most instances is not justifiable and accounts for many disappointments following the operation”. He suggests that operation is advisable only in those cases in which it can be shown that the tonsils and adenoids are obstructing the air passages or harbour infection; in such cases beneficial results may be anticipated. The presence of diseased tonsils and adenoids certainly accounts in some cases for a persistent cough.

*Enlarged cervical glands.*—Chronic cervical lymphadenitis is a certain indication for operation. Kaiser (1932) found that between the ages of seven and sixteen years the majority of attacks of cervical adenitis were secondary to a throat infection. He regards tonsillectomy as a protection against this type of infection and would advise operation when infected tonsils are recognized.

*Tuberculous cervical adenitis.*—Similarly in tuberculous cervical adenitis the portal of entry is usually the tonsil: active tuberculosis has been found in the tonsil in such cases by many investigators. Ahronheim (1938) discovered tuberculosis in 6 out of 782 pairs of tonsils enucleated. He believes the examination of further microscopical sections would have disclosed more cases of unsuspected tuberculous infection. Kaiser (1932) states that in about one-half of the cases of tuberculous cervical adenitis there is a primary infection of the tonsil. Tonsillectomy certainly forms an important part of the treatment of these cases.

*Ear trouble.*—Attacks of deafness due to Eustachian catarrh, recurrent attacks of earache and otitis media, and chronic otorrhœa often indicate that operation should be performed. The removal of adenoids will sometimes be sufficient; care will of course be taken to exclude sinusitis as a cause of the symptoms. Nowadays the removal of tonsils and adenoids in cases of chronic otorrhœa is probably much less often carried out as a routine measure than formerly; so often has it been found that the cause of the continued otorrhœa is infection of the mastoid antrum and cells. This diagnosis is suggested by continued, and often copious, otorrhœa and pronounced deafness; considerable help in diagnosis is given by careful X-ray examination of the mastoid.

*Other complaints in children.*—The advisability of tonsillectomy is sometimes considered in conditions of nasal allergy or asthma. On the whole results have been found not to justify operation. Kaiser (1932) in his careful study found no benefit to result. Similarly he found that the tonsils could not often be held responsible for laryngitis, bronchitis or pneumonia. Children with anorexia, in whom other causes were excluded, were benefited by tonsillectomy in at least 50 per cent. of the cases. He also found that

*History and examination.*—The taking of a careful history will disclose the number and nature of the attacks of sore throat and their severity; whether there is at any time enlargement or tenderness of the cervical lymphatic glands; whether a foul taste is sometimes noticed in the mouth or a foul smell in the nose.

In examining the patient the teeth and mouth as well as the tonsils must be examined and the examination should always include inspection of the nose and nasopharynx and transillumination of the sinuses. It is hard to define the appearance of the septic tonsil. Size will be noted but this alone is not a dependable criterion. Persistent redness of the tonsil and the adjacent mucosa suggests underlying infection. Pressure with the spatula will empty the crypts; white, cheesy epithelial debris is not regarded as abnormal, but tonsils containing purulent matter or material with a foul taste and smell should be suspect. The guilty tonsil is often small, buried and fibrotic. Soft-looking tonsils are often the cause of symptoms. Tonsils giving rise to exacerbations of acute inflammation, often with cervical gland enlargement, should be condemned. There may be systemic signs of sepsis, such as leucocytosis, low-grade pyrexia and an increased blood sedimentation rate. The patient must be questioned to see if any relationship between tonsillar inflammation and the onset or exacerbation of any systemic disorder can be established.

#### INDICATIONS FOR OPERATION IN CHILDREN

*Recurrent tonsillitis.*—The principal indication for operation both in children and in grown-ups remains recurrent attacks of tonsillitis. If a child of five years, or older, has three attacks of acute tonsillitis in a year the tonsils should be removed. Operation should also be undertaken if there has been a quinsy, for it is usual, sooner or later, for other quinsies to occur and their occurrence is evidence of deep infection in the tonsil.

*Impaired nasal respiration.*—Interference with normal nasal respiration by day or by night is rightly regarded as an indication for operation. In the child under five years old, removal of the adenoids alone will often suffice to permit of normal nasal breathing. When the tonsils are very large they undoubtedly play a part in producing mouth breathing by encroaching on the nasopharynx. Adenoid enlargement certainly causes mental retardation and high arching of the palate, and malocclusion of the teeth will result in long-standing cases. After operation, care must be taken to see that correct nasal breathing is re-established: exercises and the wearing of an oral screen may be necessary. Certain *alterations of the voice*, the dead "nasal" voice of adenoids and the thick muffled voice of enlarged tonsils and adenoids, are cured by operation and correct after-treatment which may involve, of course, subsequent speech training.

There is much less tendency in these times to remove the tonsils just because it has been decided that the adenoids should be operated on; only

fair chance that "chronic rheumatism" in its various forms will be relieved by tonsillectomy.

*Eye conditions.*—In a number of eye conditions a hunt is made for a focus of sepsis. Duke-Elder (1940) says that endogenous inflammations form the great majority of inflammatory conditions affecting the uveal tract and are caused by the entrance into the blood stream of organisms, or their products, from some source situated elsewhere in the body. He mentions that many recent writers believe that tonsillar infection is as important as dental. He postulates as a plausible hypothesis, and one more justifiable than any other, that cases of uveitis are due to the excitation of a local allergic reaction by bacterial products liberated from some focus of infection in an immune but allergic patient.

*Thyrotoxicosis.*—The frequent association of tonsillitis with the onset of toxic goitre, or with its relapses, is common knowledge. Attacks of tonsillitis often have the most grave results in these cases. Fraser and Dunhill (1937) believe that chronic infection of the tonsils contributes to the chronicity of the disease. In suitable cases tonsillectomy should be carried out, although it is advisable to make a careful choice of the time of operation and this should sometimes be deferred until thyroidectomy has been performed.

How far treatment by thiouracil will cause any lessening in the need for tonsillectomy remains to be seen. It is of the greatest importance if tonsillectomy is to be undertaken that it should be done at the time, and under the precautions, advised by the physician in charge of the case.

*Acute rheumatism.*—At one time tonsillectomy was often carried out in children who had suffered from acute rheumatism. Many investigators have shown that tonsillectomy does not prevent recurrences. Ash (1938) investigated 522 children and reported that tonsillectomy did not prevent recurrences: neither the presence nor the absence of the tonsils at the time of the initial infection, nor subsequent tonsillectomy, had any demonstrable influence on the incidence of cardiac involvement or the death rate. Kaiser (1932) concludes that it is desirable to recommend enucleation of the tonsils in those children subject to recurrent throat infections.

Forest Smith (1947) believes that when operation on the tonsils is indicated by their condition, or because of the symptoms they cause, much benefit results in children who suffer from acute rheumatism. These children suffer from so much chronic invalidism that operation should be undertaken if it will lessen this to any extent. The operation must be performed in a quiet period, and with adequate precautions. Careful observation and rest, both before and after operation, are essential, and the child should be given salicylates and either sulphonamide or penicillin in adequate dosage. Although he agrees that recurrences of acute rheumatism are not influenced, he is sure that the likelihood of subacute bacterial endocarditis in later life is greatly lessened.



tonsillectomy favourably influenced about 45 per cent. of cases of cyclical vomiting (acidosis).

#### INDICATIONS FOR OPERATION IN ADULTS

The indications already mentioned in the case of children apply in many cases to adults. It is "economic" to remove the tonsils if sore throats occur regularly two or three times a year, necessitating absence from work for a week or two on each occasion. At its peak, the vogue for *focal sepsis* was the cause of many operations being done. There is, as has already been mentioned, a much more questioning attitude at the present time and focal sepsis would seem now to have had its hey-day. Horder (1940) defines focal sepsis" as:—

"A term used to signify the presence of a local and chronic infection, itself yielding few or no symptoms, yet resulting in a state of toxæmia, with or without mild bacteriæmia, and leading to a number of general or remote local disturbances".

He includes the tonsils as one of the most common sites of focal sepsis, and of this he says:—

"The effects are widespread. In some cases it is a state of general ill-health which attracts attention: fatigue, headache, backache, insomnia and neurasthenia. In others the symptoms may be referred to special organs or tissues. Of these fibrositis is the most common: arthritis, peri-neuritis, myalgia and 'chronic rheumatism' in all its forms. [After stating that the idea of focal sepsis was hard worked in its early days he finds] in the practice of most of us the pendulum has come to rest at a point of equilibrium [although] doubtless there are some who still work it too hard, neglecting to give due consideration to nervous, metabolic, hormonal, environmental and heredity factors".

It must be emphasized that tonsillectomy is not now carried out in the tired, run-down adult unless there are definite and positive indications for the operation.

#### SOME CONTROVERSIAL INDICATIONS

Consideration must now be given to certain conditions for which tonsillectomy has often been advocated in the past and an attempt will be made to indicate present trends. The list does not pretend to be exhaustive.

*Chronic rheumatism.*—Copeman (1936) says that a focus of infection is generally assumed to be present in cases of rheumatoid arthritis. He states that the tonsils are as often the focus of infection as the teeth and suggests that the tonsils should be removed if there is evidence that they are septic, and particularly if there is a clinical history of recurrent sore throats. He points out the benefits which follow the removal, in appropriate cases, of tonsillar remnants resulting from the incomplete removal of tonsils in childhood. Robin (1946) suggests that the reaction to vaccine therapy and the blood sedimentation rate are two useful pointers in deciding whether a septic focus must be suspected or whether it should be removed. It may be said that when the tonsils can be identified as a septic focus there is a

of one family. All five developed bulbar poliomyelitis, in three cases with fatal results. The sixth and youngest child was not operated on and remained well, although the virus was found to be present in his stools.

### CONCLUSION

To sum up, the findings of Smith (1936), who became interested in whether all the 2,200 tonsillectomies performed annually at the Massachusetts Eye and Ear Infirmary were really indicated, may be quoted. He carefully correlated the history which led to tonsillectomy with the pathological condition found in the tonsils, and investigated the subsequent clinical course. He found that the removal of the tonsils and adenoids proved beneficial in cases in which the tonsils were recognized as septic and in which there was a history of recurrent colds and "sore throats", aural involvement, nasal obstruction, cervical adenitis and enlarged tonsils. The procedure, not surprisingly, was of questionable value in cases of indigestion, laryngitis and pain in the throat. Of the patients who had had their tonsils removed because they were thought to harbour focal sepsis all claimed clinical improvement in their symptoms. Several patients said they were completely cured but examination did not confirm such a happy report.

### References

- Ahronheim, J. H. (1938): *Laryngoscope*, 48, 749.  
Ash, R. (1938): *Amer. J. Dis. Child.*, 55, 63.  
Bedford, D. E. (1937): *Brit. Encycl. med. Pract.*, 6, 214.  
Copeman, W. S. C. (1936): *Ibid.*, 2, 74.  
Duke-Elder, W. S. (1940): "Textbook of Ophthalmology," London, p.2140.  
Falconer, A. W. (1937): *Brit. Encycl. med Pract.*, 6, 305.  
Francis, T. et al. (1942): *J. Amer. med Ass.*, 119, 1392.  
Fraser, F. R., and Dunhill, T. (1937): *Brit. Encycl. med. Pract.*, 5, 608, 615, 620.  
Glover, J. A. (1938): *Proc. roy. Soc. Med.*, 31, 1219.  
Horder, Lord (1940): *Post-Grad. Med. J.*, 16, 23.  
Illingworth, R. S. (1939): *Lancet*, 2, 1013.  
Kaiser, A. D. (1932): "Children's Tonsils In or Out," Philadelphia.  
Reiman, H. A., and Havens, W. P. (1940): *J. Amer. med. Ass.*, 114, 1.  
Rhodes, A. J. (1947): *Bull. Hyg.*, 22, 353.  
Robin, I. (1946): *Rheumatism*, 3, 25.  
Smith, H. D. (1936): *Arch. Otolaryng.*, 24, 488.  
Smith, J. Forest (1947): (Personal communication).

*Malignant endocarditis.*—In subacute bacterial endocarditis the two most important predisposing factors are an already damaged endocardium and an infective agent. Falconer (1937) stresses the importance of expeditiously clearing up infective foci in the tonsils or elsewhere. Similarly, Evan Bedford (1937) advocates the removal of septic tonsils in cases of congenital heart disease to reduce the chance of malignant endocarditis supervening.

*Nephritis.*—There is no doubt that acute nephritis often starts with an attack of tonsillitis: a considerable literature on the value of tonsillectomy in cases of nephritis has been produced; opinions are many and varied. Kaiser (1932) believes that, on the whole, tonsillectomized children suffer from nephritis less often than those who have not been submitted to operation. He states that removal of infected tonsils, after an attack of acute nephritis, is desirable. Illingworth (1939), in a study of 365 cases of nephritis, concludes that tonsillectomy does not prevent nephritis and that, as a therapeutic measure, it is without value. He found no evidence that the operation prevents nephritis from progressing to the chronic stage; in his opinion tonsillectomy may cause nephritis. Forest Smith (1947) believes that tonsillectomy has a definite value in these cases. If septic tonsils are present they should be removed as a measure which will help to reduce the chronic ill-health of these children. The operation should be undertaken with adequate precautions: when the disease is quiescent, if possible, with rest in bed before and after operation, alkalization of the urine and under suitable sulphonamide or penicillin medication.

*Carriers.*—Tonsillectomy is a well-recognized method of treatment when certain organisms persist in the throat in spite of general and local treatment. The removal of the tonsils and adenoids is necessary in some cases of "diphtheria carriers". In those who harbour the hæmolytic streptococcus in their throat and who, by the nature of their work, constitute a danger to others (e.g. midwives and theatre nurses) tonsillectomy is advisable and will bring about the disappearance of the organism.

#### TONSILLECTOMY AND POLIOMYELITIS

The recent epidemic of poliomyelitis in this country caused a cessation of tonsil and adenoid operations. Rhodes (1947) noted that many cases of bulbar or bulbo-spinal poliomyelitis have developed within seven to thirty days of tonsillectomy or adenoidectomy. In such cases the virus must have been present at the time of operation or have been deposited there shortly after it, while the tissues were still "raw". It appears that the virus travels to the bulb along the nerve fibres exposed at operation. As a preventive measure he advises that in a period of epidemic prevalence no tonsil or adenoid operation should be carried out. A striking illustration of the risk of operation is reported by Francis *et al.* (1942):—

Tonsillectomy was performed on the same day on five apparently healthy children

side the capsule opposite the superior tonsillar fossa, and forms therefore above the upper pole, with bulging and immobility of the palate. In many cases, of course, the abscess is diagnosed and can be opened, after cocainizing the palate, with the point of a guarded scalpel and a pair of angular forceps. But in some cases the abscess discharges itself, either through a small perforation in the palate, or through its site of origin in the superior tonsillar fossa. The patient then suffers from oozing of pus, which is likely to be fetid.

The treatment lies in free opening by a slightly curved incision on a level with the base of the uvula. It is my impression that some cases of acute tonsillitis treated with sulphonamides may progress to a condition of chronic peritonsillar abscess with pus formation, and with subsequent leaking of pus. This does not mean that the sulphonamides have no place in the treatment of acute tonsillitis, but if given, the dosage should be adequate, i.e., usually 1 gm. four-hourly, continued for four or five days.

*Spontaneous hæmorrhage from tonsillar fossa.*—On one occasion I made the usual incision into what appeared to be a typical peritonsillar abscess in a boy of fourteen years of age.

There was an immediate gush of blood which spouted as far as the middle of the tongue and had to be controlled by pressure of a finger. It required some hours to find a surgeon to come and tie the external carotid artery, and during this time it was impossible to release pressure. Bleeding was controlled for a week, but then recurred, with a fatal termination. The hæmorrhage had come from the ascending pharyngeal branch of the external carotid, this vessel having sloughed as it coursed through a peritonsillar abscess. Anastomosis with the other side appeared to be the reason for the recurrence of hæmorrhage after a quiet interval.

A second, similar case was referred to me by a general practitioner who had quite rightly opened an abscess in a middle-aged man.

Luckily, after an initial severe hæmorrhage, the bleeding ceased, but recurred when the patient reached hospital. In his case, I adopted the plan of removing the tonsil to give exposure, and it was then possible to pick up the ruptured artery in the tonsillar bed.

Several similar cases have been reported, and the best method to adopt would appear to be control from the tonsillar bed; if necessary, a pack of gauze soaked in iodoform could be sewn in between the pillars of the fauces, as is sometimes necessary after a simple tonsillectomy.

*Parapharyngeal abscess.*—A peritonsillar infection may not only lead to a disaster similar to that described above, but may cause widespread inflammation in the parapharyngeal space. This is a region bounded medially by the wall of the pharynx, posteriorly by the front of the vertebral column, and laterally by the mandible with its covering muscles above, and by the pre-tracheal, sternomastoid and trapezius muscles below, together with the fascia which connects them. In this space lie the vessels in the carotid sheath with branches from both the external carotid artery and the internal jugular vein, the 9th, 10th and 12th cranial nerves, the sympathetic and the phrenic and the glands of the cervical chain and post-pharyngeal region.

Infection of this potential space may arise from various causes. Acute

# SOME UNUSUAL CONDITIONS OF THE THROAT

By V. E. NEGUS, M.S., F.R.C.S.

*Surgeon for Diseases of the Ear, Nose and Throat, King's College Hospital.*

IN the course of years, many peculiar conditions of the throat are met with; many of these are surprising and alarming at first sight, but a second, similar appearance is recognized more easily and is therefore less disturbing. It may therefore be of value to refer to some of the unusual conditions which reach the laryngologist and may fall into the experience of a general practitioner.

*Contracted palate.*—A condition which leads to disturbing and intractable symptoms is pulling down of the soft palate by scarring in the pillars of the fauces. This condition follows tonsillectomy, although luckily only rarely. It is, I believe, due to excessive zeal when removing part of the lingual tonsil where it communicates with the lower pole of the palatine tonsil; but it may also be due to damage to the bed of the tonsil. It would be unfair to ascribe it always to faulty technique, as it may follow the most careful dissection. When the palate is prevented from executing free movements there is difficulty in the removal of debris and secretions from the nasopharynx. Normally they are carried away by peristaltic swallowing movements after being dumped by the ciliary streams from the nose and sinuses.

Not only does the patient suffer from post-nasal catarrh, but also from granular pharyngitis. A nasal spray containing  $\frac{1}{2}$  per cent. sodium bicarbonate, with 10 per cent. glycerin, together with small doses of potassium iodide, may liquefy the secretions and prevent stagnation; lozenges of krameria or a spray of 2 per cent. protargol are useful for shrinking the granular lymphoid patches.

*Tonsillolith.*—Every practitioner will have met with many cases in which there are concretions in the crypts of the tonsils; the patient often experiences symptoms which seem to be out of proportion to the small, chalky collection, and he is also alarmed by what he describes as ulceration. The small concretions are easily removed and are of no particular account. I have, however, seen a patient sent home from North Africa during the recent war with a markedly enlarged tonsil diagnosed as a new growth, probably of sarcomatous nature.

In this case, the lymphoid tissue of the tonsil was not showing a deficiency, but the whole mass felt stony hard; and, in fact, this was a correct description, for at an examination under anaesthesia a stone-like mass was felt with a probe, and after slitting up and enlarging the superior tonsillar fossa it was readily removed. This mass was a chalky concretion of considerable size and it was a relief to all concerned to achieve this simple means of cure.

## PERITONSILLAR INFECTION

*Leaking peritonsillar abscess.*—A peritonsillar abscess is located usually out-

side the capsule opposite the superior tonsillar fossa, and forms therefore above the upper pole, with bulging and immobility of the palate. In many cases, of course, the abscess is diagnosed and can be opened, after cocainezing the palate, with the point of a guarded scalpel and a pair of angular forceps. But in some cases the abscess discharges itself, either through a small perforation in the palate, or through its site of origin in the superior tonsillar fossa. The patient then suffers from oozing of pus, which is likely to be fetid.

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Infection of this potential space may arise from various causes. Acute

pharyngitis of pneumococcal or streptococcal type may lead to infection through lymphatic channels; a perforating foreign body in the pyriform fossa may cause an abscess or surgical emphysema; or a peritonsillar abscess may also break through its boundaries. There is tenderness, swelling and possibly crackling from emphysema, followed, if an abscess forms, by fluctuation. If any of these signs appear, the patient should be given full doses of penicillin intramuscularly; and if swelling is marked, an operation must be carried out, the incision being made along the anterior border of the sternomastoid.

Apart from cellulitis and suppuration, and the danger of spread to the mediastinum, other complications are thrombophlebitis in the internal jugular vein or its branches, or rupture of a vessel, either a vein or an artery.

I myself have opened a tense abscess, suspecting that it might contain blood, and this proved to be the case; a perforating foreign body had led to sloughing of the common carotid artery, an inch of which had broken down. Naturally the operation was upsetting, although it was possible to control the bleeding temporarily.

#### FOREIGN BODIES

*Perforating foreign body.*—If a patient says that a bone has lodged in the throat a few hours or a day or two before, and if the feeling of pricking or pain continues, with some difficulty in swallowing, the surgeon must satisfy himself that no foreign body is present and must not ascribe the patient's symptoms to neurosis. X-rays are seldom effective in showing a bone unless it be a dense one which may be seen in a lateral view, but a suspicion of an organic cause for the symptoms may be obtained by one or more signs; there may be tenderness or swelling at the level of the cricoid cartilage; there may be pain on moving the larynx from side to side; or there may be a collection of frothy saliva in the lower part of the pharynx. When suspicion is aroused, the only effective means of treatment is by direct examination with an œsophageal speculum, the patient being well relaxed under a general anæsthetic.

*Impaction of a large foreign body.*—On occasion, a patient has been known to swallow too large a piece of meat or orange—amongst objects I have seen—and to get this large mass stuck in the lower pharynx. Attempts to remove the object with the finger may result in pushing the foreign body into the laryngeal aperture and causing obstruction to breathing.

In an emergency, the only rapid and effective way of saving the patient—there being no suitable instruments to hand—would be by opening the crico-thyroid membrane by a transverse cut, which could be made with a penknife; such an emergency has not occurred in my personal experience.

#### ULCERATION

*Pharyngomycosis.*—Patients sometimes complain of ulceration in the pharynx; on examination they are seen to have small masses of white adherent material on the surface of the palatine tonsil or at the base of the tongue. The condition is mycelial in origin and of little importance. The

nodules are difficult to remove but, unless observed visually by the patient, they cause little disturbance. Lozenges of phenol, to reduce sensation, and swabbing of the affected spots with guaiacol, 4 per cent. in glycerin, should be sufficient treatment.

*Non-specific ulceration.*—Patients sometimes present themselves with ulceration of the posterior pharyngeal wall, sometimes spreading on to the fauces or the palate; the ulceration is shallow and covered with thick exudate. There is pain on swallowing, and the health may be undermined by lack of sufficient food. In some of these cases examination, however thorough, may fail to reveal the cause of the condition. There may be found an entire absence of syphilis, and even if mercury, iodides, arsenic or bismuth are given, no benefit results. Various organisms, of the type usually found in the pharynx, may be present; the use of penicillin, as pastilles or by intramuscular injection, may cause slight improvement by reduction of local sepsis but may fail to cure the condition. Sections from the edge of an ulcer do not show evidence of endothelial reticulosis or of Boeck's sarcoidosis; the latter are both of them conditions that may be found in the pharynx, the former without ulceration, the latter with, but histological examination—and skiagrams of the chest in the case of sarcoidosis—should establish the diagnosis.

The condition progresses in an indolent manner and is dissimilar to the more rapid and destructive progress of malignant granuloma, which sometimes affects the nose or pharynx, with great destruction of tissue. The only explanation of such ulceration is avitaminosis, but the giving of full doses of vitamins may be found to have no effect. Deep X-ray therapy in light doses can be tried, but in my experience the final result is to find the ulceration still present after all thought and energy have been expended on finding a cure.

*Agranulocytosis.*—The ulceration in this condition affects the tonsils and may be extensive and deep; enlargement of glands and the serious state of the patient's health will point to the need for a blood count, which will decide the diagnosis. Injections of pentose nucleotide will be required, together with penicillin to control the secondary sepsis which is an important factor in causing death.

*Bowen's disease.*—The patient may be seen with a rough infiltration of the mucosa over the palate; small nodules are raised without ulceration. The condition is one of hypertrophic keratosis similar to the changes originally described as affecting the skin. Local treatment is unlikely to be effective and, as symptoms are slight, is scarcely required, but a careful watch must be kept for any rapidity of progress, or ulceration with a hard margin, indicative of malignant changes. If these are suspected, it may be decided to take a specimen for biopsy; treatment is most effectively carried out by diathermy excision.

#### NEOPLASMS AND CYSTS

*Mixed salivary tumour.*—A patient may come to the practitioner with the complaint of feeling a lump in the throat, possibly associated with some



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*Pharyngomycosis.*—Patients sometimes complain of ulceration in the pharynx; on examination they are seen to have small masses of white adherent material on the surface of the palatine tonsil or at the base of the tongue. The condition is mycelial in origin and of little importance. The

interval after the onset of the disease, the first sign of which may be the appearance of vesicles on the pinna or in the external auditory meatus. Recovery from this condition may be complete, but the dysphagia can be distressing. If restoration of movement of the pharyngeal muscles is delayed, direct stimulation with the galvanic current is a method of acceleration.

*Vallecular dysphagia.*—In the great anteater there is a deep depression at the base of the tongue, which appears to be used for the temporary storage of ants before they are swallowed; in man, this recess has been known to be used for the concealment of diamonds in mine workers. But apart from these useful purposes, the vallecula may cause considerable discomfort if it is excessively deep, as it may lead to accumulation of food and saliva, which later overflow and lead to violent coughing if the larynx happens to be open at the time. Direct examination may show a collection of saliva or food at the base of the tongue, and skiagrams, taken after swallowing barium, will show filling of symmetrical recesses in this region. Clearing the pharynx with water after a meal seems to be the only means of treatment.

*Paralysis of the pharynx.*—Herpes has already been referred to, and is one reason for unilateral paralysis of the elevators and constrictors of the pharynx, with dysphagia. From whatever cause the condition arises, there will be noticed the symptoms of dysphagia and deficient movement of the palate and pharynx on the affected side. During attempts at swallowing the posterior pharyngeal wall may be seen to shift laterally towards the healthy side; this is known as Vernet's sign. In my experience, many conditions have been found to cause this form of paralysis, amongst them claudication or thrombosis of the posterior inferior cerebellar artery, with hemiplegia; I have been asked to see patients whose only symptom was dysphagia, all the other signs having disappeared. A similar condition may be caused by a growth at the base of the skull, possibly spreading out from the nasopharynx; the nerves coming through the jugular foramen are involved, and there is therefore paralysis, not only of the pharynx, but also of the shoulder, from implication of the spinal accessory nerve, which supplies the sternomastoid and trapezius. A further extension of such a growth may involve the hypoglossal nerve, the paralysis then causing unequal protrusion of the tongue.

A patient had been sent to me complaining of dysphagia following an accident in which he was thrown from a lorry on to the top of his head. Finding paralysis of the pharynx, I asked him whether he could use his arm: he replied that he could do so except when he tried to throw a cricket ball. He had a fracture at the base of the skull, passing through the jugular foramen, with callus formation pressing on the 9th, 10th and 11th nerves.

#### CONCLUSION

I have, more or less at random, described some of the peculiar conditions I have seen in the pharynx; possibly each has occurred only once, and it may be that the general practitioner will see only a proportion of those referred to. But it is hoped that a reminder of the possibilities may enable him to recognize such of these somewhat rare conditions as may come his way.

discomfort in swallowing. On examination, the palate is found to be bulged and the lateral pharyngeal wall pushed in, with displacement of the tonsil. The mass is hard, and in some cases its size gives rise to surprise that the symptoms are not greater. Progress is slow, but unfortunately there is a possibility of ulceration, with serious consequences. It is therefore advised that if such a large mass be discovered, it should be removed by dissection. The operation progresses smoothly at first, with cleavage outside a firm capsule, but as the growth is freed in other directions there will be found difficulty on passing upwards. It is probable that these growths are continuous with the parotid, and the time comes in the dissection when it is necessary to cut across the base of the tumour. The application of diathermy to this unremoved portion may prevent recurrence.

*Mucocele.*—Distention of a mucous gland may cause the formation of a small, tense swelling in the posterior pharyngeal wall; the patient may think he has cancer and be alarmed. It is usually sufficient to open the cyst and paint its base with 10 per cent. silver nitrate; this, with reassurance, is all that is required. In other cases, a big mucocele may be found in the vallecula, filling up the space between the base of the tongue and the epiglottis. This may be discovered when an examination is made for some other purpose, with no complaint from the patient of any symptoms attributable to the cyst. In such a case it may well be left alone, but if the patient complains or if the cyst appears to be pushing the epiglottis backwards over the laryngeal aperture, then operation is required; this can be done through the mouth.

*Sarcoma of the tonsil.*—I have referred to a patient suspected of sarcoma who had a tonsillolith; I have seen other confusing cases in which the diagnosis was not at first apparent.

One was a woman with a deep ulceration of her tonsil, thought to be due to Vincent's angina. Penicillin gave improvement, both symptomatically and clinically, but the ulceration later increased and began to spread beyond the confines of the tonsil. The only diagnosis in this case was sarcoma, and the condition was temporarily arrested by deep X-ray therapy; but in round-celled or lymphosarcoma, recurrence is unfortunately the probability. Another case was that of a man who had all the symptoms and signs of an acute peritonsillar abscess. He had been treated with sulphonamides, as he appeared to have a chronic abscess. Incision revealed a cavity with some sloughing but no actual pus. Improvement followed and all seemed well, except that the tonsil remained large. It was decided to remove it, but when an examination was made under anæsthesia, the hardness of the tonsil, and its friability, immediately established the diagnosis; biopsy showed reticulum-celled sarcoma, and deep X-ray therapy caused the mass to disappear. In this type of growth cure is to be expected.

#### DYSPHAGIA AND PARALYSIS

*Herpes.*—Herpes may affect the ganglia of the glosso-pharyngeal nerve, with the formation of vesicles in the pharynx or on the palate. There may at the same time be a similar affection of the geniculate ganglion, with facial paralysis; or the ganglion nodosum of the vagus may also be involved, with paralysis of the constrictors of the pharynx and the vocal cords. The diagnosis is not difficult, but the pharyngeal signs may be found at an

described (Brown, 1947), but this clears up when treatment is stopped. Systemic penicillin and sulphonamides by mouth are not necessary.

#### VINCENT'S ANGINA

It has been shown that the causal organisms in this condition are penicillin sensitive, indeed penicillin has largely taken the place of the older arsenical preparations in treatment. MacGregor and Long (1944) found that a useful concentration of penicillin could be maintained in the saliva by the constant sucking of pastilles (500 units) and that rapid recovery followed their use in all but severe cases. In severe cases with extensive ulceration and considerable constitutional disturbance, systemic penicillin should be given without delay. It is difficult for a busy practitioner to arrange three-hourly injections night and day, whilst twice daily injections of the wax-oil preparations containing 250,000 or 300,000 units is a tedious procedure. Evidence is accumulating to show that similar large doses in aqueous solution, thrice or even twice daily, are equally effective. It is of the utmost importance to search for and eradicate gum pockets; should this step be neglected and recurrence take place a second course of penicillin may not be effective. It is wise to prescribe vitamin B complex and vitamin C as an adjuvant to treatment. Aphthous ulcers involving the tongue, alveolar-labial groove or fauces are often mistaken for true Vincent's angina; nicotinic acid cures a small proportion of such cases but penicillin is valueless. Bacteriological examination is necessary to distinguish the two conditions.

#### DIPHTHERIA

Laboratory work *in vitro* has suggested that penicillin might prove effective in the treatment of diphtheria but animal experiments have failed to support this contention. It is probable that the virulent organisms producing human diphtheria are virtually penicillin resistant. It is of paramount importance to realize that penicillin does not neutralize free toxin already circulating in the tissues and therefore cannot replace antitoxin. The clinical picture of diphtheria in adults is not uncommonly clouded by a very heavy secondary streptococcal infection, whilst the characteristic membrane is so small that it is easily missed. When either sulphonamides or penicillin are given to such patients the improvement in their condition is often so dramatic that further search for membrane is abandoned and swabs are not examined. During the war period I saw several cases of typical post-diphtheritic paralysis following "acute tonsillitis which had responded to chemotherapy".

Both sulphonamides and penicillin have a place in the treatment of diphtheria with heavy secondary infection, but such treatment is of minor importance and must never be a substitute for antitoxin therapy.

#### ACUTE TONSILLITIS

With few exceptions this is a self-limiting disease and if treated in a rational

# THE PRESENT STATUS OF PENICILLIN AND THE SULPHONAMIDES IN INFECTIONS OF THE THROAT

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It is well known that penicillin and the sulphonamides may produce dramatic effects in the treatment of throat infections, but cases are often reported in which the results of chemotherapy have proved disappointing. There must be some explanation for these disappointments, and careful scrutiny of the measures generally adopted demonstrates that antibiotic drugs alone are too often depended upon to provide a cure, whilst general principles of medicine are forgotten. Patients who have an incomplete knowledge of the action of antibiotics tend to demand a course of treatment from their doctor whether indications are present or not. The initial response to chemotherapy is often so rapid that patients abandon treatment against medical advice.

By now every practitioner knows the importance of prescribing sulphonamides or penicillin in the early stages of acute infective conditions, they are aware of the pitfalls arising from insufficient dosage, but it must regretfully be admitted that they are occasionally stampeded by their patients into discontinuing treatment too soon and into allowing the resumption of work without insistence upon a period of rest. Sulphonamides and penicillin are still prescribed when inflammation has progressed to suppuration, although in such cases there is no substitute for the well-established principle of surgical drainage. Chemotherapy allows a surgeon more latitude in his choice of the time for surgical intervention but the indications for operation must still be respected.

I propose to mention some common inflammatory diseases of the throat and to discuss in greater detail what I consider to be a rational approach to the prescribing of antibiotic drugs.

## ACUTE PHARYNGITIS

This condition is usually but part of a generalized infection affecting the upper respiratory tract, and to treat it without regard to any coexisting nasal or paranasal sinus infection is illogical and futile. It is justifiable to prescribe penicillin lozenges or pastilles (500 units in each lozenge), which should be allowed to dissolve in the mouth as slowly as possible throughout the waking hours, but a careful search must be instituted for primary causes in nose, sinuses or teeth and steps taken forthwith to eradicate such causes. It should be recognized that prolonged sucking of penicillin lozenges sometimes gives rise to glossodynia which is more unpleasant than the original pharyngitis; cases of exfoliation of the filaments of the filiform papillae have been

is indicated. Neither the sulphonamides nor penicillin can effect a cure. After tonsillectomy, sulphanilamide powder may be insufflated so as to form a "frosting" upon the tonsil bed, whilst penicillin pastilles may be dissolved in the mouth. These measures have been proved to minimize discomfort and accelerate healing.

#### RETROPHARYNGEAL ABSCESS AND PARAPHARYNGEAL ABSCESS

Assuming that tuberculous abscess has been excluded, there is a place for antibiotics in the treatment of these conditions. The principles discussed under the heading of quinsy apply here, namely, that full doses given in the early pre-suppurative stage may cause resolution, but that when pus is present it must be evacuated by accepted surgical methods.

#### ACUTE LARYNGITIS

This disease is a common accompaniment of simple infections of the upper respiratory tract but there is a well-known and potentially serious variant due to invasion by virulent organisms, commonly streptococci. There may be œdema of the glottis and perichondritis of the laryngeal cartilages, with alarming dyspnoea. This fulminating type of laryngitis must be recognized early, for its response to the administration of sulphonamides or penicillin is usually dramatic. Treatment with full doses in the early stages will often save patients from tracheotomy.

#### TRAUMA AND FOREIGN BODIES

Whenever it is suspected that there has been damage to the pharynx, larynx or trachea as the result of accidental wounds or the swallowing of sharp foreign bodies, penicillin should be given as a prophylactic measure to guard against the spread of infection into the tissues of neck or mediastinum. Naturally this does not absolve the surgeon from his duty to treat wounds on their merits or to remove impacted foreign bodies.

#### CONCLUSION

Antibiotics are of the utmost value in the treatment of many throat infections but medical men must never allow themselves to rely too much upon the drugs under review. The temptation to stop treatment too early and to allow patients to resume their activities without an adequate period of rest must be strenuously resisted. When pus is present it must be evacuated.

#### References

- Brown, R. L. (1947): *Arch. Otolaryng.*, 45, 355.  
MacGregor, A. B., and Long, D. A. (1944): *Brit. med. J.*, ii, 686.

manner need cause little concern to the medical attendant. Bed rest, a light diet, copious fluids and a diaphoretic mixture usually suffice unless the case is a very severe one. As has been mentioned under the heading of Vincent's angina, penicillin pastilles can maintain a concentration of the drug in salivary secretions sufficient to justify their use, and it is found that recovery is thereby hastened. When tonsillitis is severe and accompanied by great constitutional disturbance, sulphonamides or penicillin should be given even before the causal organisms have been tested for sensitivity; this is especially important if the cervical glands are enlarged and tender. Healthy adults may be given a 3 gm. loading dose of sulphathiazole, followed by 1 gm. maintenance doses four-hourly until a total of 30 gm. has been taken. Sulphadiazine and sulphamezathine are more convenient because their slower excretion allows more widely spaced doses and less disturbance to sleep. The importance of a high fluid intake and a satisfactory excretion of urine is too well known to call for further emphasis. It is unfortunate that even now patients are often allowed to discontinue sulphonamides as soon as the temperature has fallen; on many occasions this practice is followed by relapse in a week or ten days and the development of a quinsy which may have a somewhat insidious onset with less pain than usual. If it is decided to use systemic penicillin, this drug also must be given in full doses and injections must be continued for at least five days; three-hourly doses of 20,000 units (aqueous) is in practice no more effective than 300,000 units twice daily using the wax-oil preparations.

#### QUINSY

Practitioners often aver that antibiotics will always cure this distressing complaint. This is a popular misconception which has arisen because a quinsy is extremely difficult to diagnose. Few doctors who practised before the advent of sulphonamides could truthfully say that they had always evacuated pus when they had attempted to "lance" a peritonsillar abscess. In the stage before a circumscribed collection of pus is present there is considerable peritonsillar swelling with displacement of the uvula and œdema of surrounding tissues. Sulphonamides or penicillin in maximal doses given at this stage will cause resolution in a high proportion of cases. Once pus is present there is still no substitute for surgical drainage. When, after careful examination, including if possible palpation, I find it difficult to decide whether the swelling is that of peritonsillitis or a peritonsillar abscess, I am perfectly content to administer antibiotics and defer the decision until the next day. I do not subscribe to the popular belief that opening into a non-existent quinsy is followed by appreciable relief.

#### CHRONIC TONSILLITIS

When chronic infection of the tonsils cannot be controlled easily by emptying the crypts and prescribing simple throat paints, operative removal

is indicated. Neither the sulphonamides nor penicillin can effect a cure. After tonsillectomy, sulphanilamide powder may be insufflated so as to form a "frosting" upon the tonsil bed, whilst penicillin pastilles may be dissolved in the mouth. These measures have been proved to minimize discomfort and accelerate healing.

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#### References

- Brown, R. L. (1947): *Arch. Otolaryng.*, 45, 355.  
MacGregor, A. B., and Long, D. A. (1944): *Brit. med. J.*, ii, 686.



# THE PROBLEM OF THE DIPHTHERIA CARRIER

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MASS immunization of the child population against diphtheria was begun in this country only at the end of 1940. The results so far achieved are reflected in the striking reduction in the annual numbers of notified cases (corrected for diagnosis since 1944) and certified deaths. In pre-immunization times the average yearly number of notifications (uncorrected) was 60,000 and the deaths 3000. In 1945 there were 18,596 (corrected) notifications and 722 deaths, and the provisional number of fatal cases in 1946 is given as 444. Even so, diphtheria obviously remains a formidable menace to children and there is still much to do before this country draws level with Canada and the United States of America where, in many cities, the disease is now rare or virtually extinct.

It is clear that a lessened incidence of clinical attacks reduces, *ipso facto*, the number of potential convalescent carriers and therefore the possible contacts, some of whom may be infected and become carriers. Thus the dimensions of the problem as it affects these two classes are steadily shrinking.

Fears were at one time expressed by some that mass immunization, although decreasing the incidence of clinical diphtheria, might increase the number of carriers in the community; that immunes, if infected with the *C. diphtheriæ*, instead of suffering clinical attacks would become carriers and thus, remaining at large, infect non-immunes. If these fears had been justified, the obvious defence would have been to increase by artificial means the proportion of immunes in the population. Among immunes, carriers are not only harmless but beneficent; by disseminating reinforcing doses of the *C. diphtheriæ* they help to maintain the general level of immunity. In practice, as the Canadian worker McKinnon (1942) points out: "Immunization extended to the greater part of the most susceptible population results in a diminished risk of spread of virulent organisms so that in time both clinical cases and carriers will virtually disappear". Parish (1947) observes that in Canadian towns where every child has been immunized the carrier rate has fallen and he refers to a recent survey of London school children (Public Health Dept., L.C.C., 1947), nearly two-thirds of whom were inoculated. The carrier rate among these children was considerably less than 1 per cent., compared with an estimated carrier rate of from 2 to 5 per cent. in pre-immunization years. This fall in the carrier rate removes fears of increased chances of infection of non-immunes but at the same time limits the possibilities of the reinforcing dose of the *C. diphtheriæ*:

"therefore [Parish advises] we shall have to pay more attention in future to periodic re-immunization after a first course if circulating antibody titres are to be maintained at a safe level".

Thus mass immunization in infancy, carried out upon a progressively increasing scale, together with reinforcing doses of the prophylactic at or before school entry and at intervals throughout school life, is capable of reducing the problem of the diphtheria carrier of any type to very small proportions.

Meanwhile, individual carriers from time to time tax the resource of the practitioner. The problem may be confined to the cure of the carrier state in a patient convalescent from an attack of the disease or, more often and more difficult of solution, may involve the diagnosis and isolation of the primary case (eventually, perhaps, to become a convalescent carrier), the examination of immediate contacts among whom, in fact, the initial source of infection is sometimes to be found, and the protection of those deemed to be at risk.

#### THE CARRIER STATE

The carrier state implies the harbouring of *virulent* strains of the *C. diphtheriae* by those who are not at the time suffering from the disease. Morphological diagnosis of the organism in stained smears provides inadequate evidence of the carrier state. The routine use in laboratories of selective tellurite media enables accurate and prompt diagnosis to be made from colony morphology, not only of the *C. diphtheriae* but of the strain, and therefore, with the exception of some *mitis* strains, provides information as to its virulence.

The carrier state may be transient or chronic. Transient carriers are contact carriers, but not all contact carriers are transient. The organism may disappear, without apparent effect, in a few days or, if the infecting dose is large or highly virulent and the existing level of immunity inadequate, the transient carrier state may merge into the clinical attack, and this may eventually result in a convalescent carrier state which may become chronic. Only a minority of chronic carriers have suffered overt clinical attacks; the carrier state from the beginning has remained latent. Again, whereas the transient carrier may or may not be immune to diphtheria at the time of infection, the chronic carrier, whether convalescent or latent, attains immunity as the result of his continuing infection.

The carrier state is clinically occult and its diagnosis depends entirely upon the bacteriologist. Cultures may be profuse or sparse and, in the chronic carrier, periods of intermittency, or apparent intermittency, are not infrequent.

*Quasi-carriers*.—Potentially more dangerous than the true carrier, since the locus of infection is overt and may be extensive and so atypical or so little productive of toxæmia as to escape early recognition and isolation, are the subjects of anterior nasal diphtheria, modified tonsillar diphtheria in

partial or lapsed immunes following infection with a highly virulent strain, and cutaneous diphtheria.

*Anterior nasal diphtheria*, often combined with streptococcal rhinitis, is the most common of these forms. It is characterized by a persistent blood-stained yellow discharge, excoriation of the subadjacent skin, and debility.

*Modified tonsillar diphtheria*.—It is recognized that *gravis* or *intermedius* strains of the *C. diphtheriae*, both highly virulent, are capable of causing clinical diphtheria among the immunized whose antibody titre has waned with time. Such attacks are occasionally severe but usually mild and atypical. Since the membrane, commonly thin and sparse and of "lacunar" distribution, separates spontaneously and rapidly, and toxæmia is either lacking or slight in degree, these cases are easily missed or regarded as tonsillitis of other causation.

Fanning (1947) describes an instructive outbreak in a preparatory day school caused by a highly virulent *gravis* strain. Of 360 children, ranging from "infants" to "seniors", 94 per cent. had been immunized, some more and some less than five years previously, and of these, 80 per cent. were found at the time of the outbreak, which was divisible into two phases, to be Schick-negative. All except three of the eighteen clinical cases, none of which proved fatal, had "received immunization which was probably adequate, and at least four were Schick-negative just before the onset of the illness". Investigation disclosed eight carriers of the *gravis* strain although most of these "gave only one positive result" and were thus transient contact carriers.

As the result of another admirable piece of field work, Webb and Macfadyen (1947) were able to show that the prolongation of an outbreak in a boarding school house was not due to carriers, although some were found among the contacts, but to a maid who continued her duties in spite of chronic lesions of the scalp from which a *gravis* strain of the *C. diphtheriae* was cultured: a reminder never to omit clinical and bacteriological examination of the staff when investigating school outbreaks of infective disease. On more than one occasion I have discovered the carrier at work in the kitchen.

*Convalescent carriers*.—Usually the patient becomes free from infection before, or shortly after, clinical recovery from the attack. This is still more likely to occur if he has been nursed throughout in a single-bedded room or cubicle. In open diphtheria wards, reinfection, possibly with a different strain of the organism, may superimpose a carrier state upon a patient who would otherwise have become, or remained, free from infection. To endeavour to cure the convalescent carrier state, as such, in the *milieu* of an open diphtheria ward is to invite delay and possibly failure. But cross-infection apart, in a proportion of patients bacteriological clearance may lag behind clinical recovery for weeks or months. Some have considered that a patient should be deemed a convalescent carrier only when swabbings have been repeatedly returned as positive for three months, but in the interests of all concerned failure to obtain bacteriological clearance by the time, or very shortly after, the patient is clinically fit is, in my opinion, a sufficient indication for active steps. There is no need to enlarge upon the

importance to the patient, whether child or adult, of the earliest possible release from isolation consistent with safety to others.

#### DIAGNOSIS OF CARRIERS

*Sites of infection.*—Whether in contact or convalescent carriers the most common sites of infection are, needless to say, the tonsils, the nasal mucosa and the post-nasal space. Aural carriers arise not from primary diphtheria of the middle ear, which is of great rarity, but from the addition *via* the Eustachian tube of the *C. diphtheriæ* to the flora of an existing otitis media and otorrhœa (since diphtheroids are to be found in the discharge in many cases of otitis media, ascertainment of virulence is especially important).

Chronic carriers frequently have some abnormal condition of the tonsillar or nasopharyngeal tissues. The most persistent throat carrier often has not large but small scarred tonsils and the actual nidus of infection may be the sulcus between the margins of the tonsil and the pillars. It should be noted also that infection may be delimited to a tiny area of one tonsil, and even after skilled dissection, usually promptly successful, the smallest tag may maintain the carrier state. The nasal carrier state tends to be maintained by such conditions as enlarged adenoids or turbinates, spurs, polypi, and a foreign body in the nostril, but surgical rectification of these defects is not so uniformly successful in curing the nasal carrier as is the removal of the tonsils of the throat carrier: the ultimate reservoir of infection may prove to be a sinus. The gingival sulcus around a decayed tooth has, on occasion, yielded the *C. diphtheriæ*.

*Swabbing.*—Separate swabs of the nose *and* throat must always be taken. In persistent carriers it is necessary to swab each tonsil and each nostril separately in order to narrow down the search for the focus. Information useful to the bacteriologist should always accompany the swabs to the laboratory. Fanning advises the swabbing of all in school outbreaks but urges that it "should be completed in the shortest possible time so that all infected children whether carriers or cases may be excluded (and isolated) without delay". This is sound advice: the occurrence of clinical cases among the immunized is, in itself, presumptive evidence of a *gravis* or *intermedius* infection, and the *gravis* strain, especially, may imperil the life of a non-immune child in forty-eight hours or less.

#### MANAGEMENT AND TREATMENT

*Isolation* of the proven carrier is, of course, essential but must be by consent; except in Scotland, there are no legal powers of detention. The importance of a single room or cubicle has already been mentioned, but, with due precautions against contact, the carrier should spend as much time as possible in the open air; *vix medicatrix naturæ* may be sufficient in itself. Isolation should be maintained until at least three consecutive swabbings from nose and throat, examined at intervals of not less than five days, have been found negative. No antiseptic should be used for twenty-four hours before the swabbings.

In *treatment* the results of various douches are not only unimpressive, but may be harmful by irritating the mucosa and possibly laying the foundations of sinusitis. The tonsillar and nasopharyngeal flora is mixed; although *C. diphtheriæ* may predominate, concomitant organisms are also present and by maintaining an inflammatory state of the mucosa prolong the carrier state.

*Chemotherapy.*—The rôle of concomitants in maintaining the diphtheria carrier state has assumed enhanced importance in relation to chemotherapy. Boissard and Fry (1942) found that the hæmolytic streptococcus is frequently present in the nasal flora of carriers and they obtained improved results in the treatment of the condition by insufflations of sulphanilamide powder, the primary effect of which was to eliminate the streptococcus.

In a critical review of the value of penicillin in the treatment of diphtheria (*qua* the elimination of the *C. diphtheriæ*) Long (1947) points out that the disease is commonly complicated by secondary infection with hæmolytic streptococci, Vincent's organisms and mixed anærobcs, and that all these are markedly penicillin sensitive. The *C. diphtheriæ* is also sensitive but in lesser degree than the concomitants. As in all other infective conditions amenable to penicillin therapy, experience has shown that to obtain the best results the antibiotic must be given systemically and in large doses. The use of lozenges and sprays, except in conjunction with systemic therapy, has been found to be unreliable and ineffective in the elimination of the *C. diphtheriæ*, but systemic therapy is effective "particularly when secondary infection is present" (Long, 1947).

As to the dosage, Karelitz *et al.* (1947) and Weinstein (1947) report successful results from the injection of daily doses of from 120,000 to 240,000 units of penicillin. Weinstein prefers the larger dose, continued for twelve days, for the treatment of the convalescent carrier and considers it to be minimal for the cure of the chronic carrier. He reports clearance in an average of 3.96 days, compared with the average of 33.25 days among those not treated with penicillin. Long (1946, 1947) considers that at least a million units are required to eliminate penicillin-sensitive organisms from the throat and gum pockets in twenty-four hours and gives details of his own observations of six cases of clinical diphtheria in support of his opinion. One million units of penicillin, given in the day by three-hourly injections, and continued for three days, were found to eliminate the *C. diphtheriæ* from the throat in twenty-four hours; the organisms were not demonstrable after the first day's treatment.

Although differences of opinion as to the degree of penicillin-sensitivity of the *C. diphtheriæ* and as to the optimum dose of the antibiotic still exist, it is clear that the problem of cure of the individual convalescent or chronic diphtheria carrier is, to say the least, well on the way to solution. It is imperative to note, however, that no satisfactory evidence has yet been produced that penicillin can *replace* antitoxin in the *treatment* of clinical diphtheria, as distinct from the elimination of the causal organism. The

antibiotic has no direct effect upon the toxæmia of the disease, and to omit early and ample antitoxin is to court disaster. The indications are, however, that penicillin given in large doses in addition to antitoxin will, by eliminating the causal organism and its concomitants, shorten the phase of toxæmia and prevent the convalescent carrier state.

As to the chronic carrier, so often the subject of nasopharyngeal abnormalities, and therefore peculiarly liable to reinfection and a recurrence of the carrier state, it would seem wise not only to eliminate the organisms by penicillin therapy but the abnormalities, when such exist, by surgical procedures.

*Protection of contacts.*—In school outbreaks, clinical cases and carriers having been isolated for treatment *secundum artem*, steps must at once be taken to protect other contacts. Should they all be Schick-tested? Much depends upon the age-groups of those exposed, the facilities for clinical observation during the forty-eight hours which must elapse between the performance of the test and the possibility of accurate readings, and upon the infecting strain. If this be *gravis* or *intermedius* no time must be lost, and especially since a negative result is no guarantee of complete protection against these strains it is preferable to omit the Schick test except perhaps in older children and adults (in order to assess sensitivity to protein) and at once to adopt the method of combined active and passive immunization employed by Fulton *et al.* (1941). For younger children, if there is no history of previous immunization, A.P.T. is the prophylactic of choice, but for those previously immunized and for older children and adults (especially if a Schick test has yielded a pseudo-positive result) T.A.F. is less likely to give rise to a reaction. In the previously immunized the dose of prophylactic reinforces the existing level of antitoxic immunity and need not be repeated, but for the others arrangements must be made for the completion of the course later. In addition, in order to provide immediate protection, a prophylactic dose of 1000 units of antitoxin should be injected. This may be omitted, at discretion, in the previously immunized, since the stimulus of the reinforcing dose of prophylactic speedily raises the existing antitoxin level.

### References

- Boissard, J. M., and Fry, R. M. (1942): *Lancet*, i, 615.  
 Fanning, J. (1947): *Brit. med. J.*, i, 371.  
 Fulton, F. *et al.* (1941): *Ibid.*, ii, 759.  
 Karelitz, S. *et al.* (1947): *J. Pediat.*, 30, 18.  
 Long, D. A. (1946): *Brit. med. J.*, i, 627.  
 — (1947): *Ibid.*, i, 884.  
 McKinnon, N. E. (1942): "Control of Common Fevers," London, p.49.  
 Parish, H. J. (1947): *Lancet*, ii, 413.  
 Publ. Hlth. Dept., L.C.C. (1947): *Ibid.*, i, 668.  
 Webb J. W., and Macfadyen, N. (1947): *Brit. med. J.*, ii, 248.  
 Weinstein, L. (1947): *Amer. J. med. Sci.*, 213, 308.

# THE THROAT IN RELATION TO SINGING AND PUBLIC SPEAKING

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THE function of speech is so popularly connected with the larynx that the other important functions of that organ are apt to be forgotten—respiratory, circulatory, fixative, protective, deglutitory, tussive, and expectorative, as Chevalier Jackson characteristically details them. Phonation is, in fact, phylogenetically a late function of the larynx and articulate speech a very late development, as Negus in particular has pointed out. Primarily the action of the larynx is that of a check valve, to prevent anything other than air from entering the lungs, and man might have learned to communicate with his fellows by means of his fingers, as the deaf and dumb do, if his primitive ancestors had not had the wit to develop the use of their vocal cords.

The name "vocal cords" gives a wrong impression of their structure; they were so named before they had been seen in action by the invention of the laryngoscope, because of a supposed resemblance to reeds or the strings of a violin. On the contrary, however, the vocal cords are solid structures, pyramidal on cross section, and would be more properly named "vocal lips". The larynx possesses greater powers of adjustment than any musical instrument: the distance between the vocal cords can be altered, the portion of the cord that vibrates can be shortened, the vibrations can be confined to the edges only of the cords and not to their whole breadth, and the tension of the cords can be varied.

## THE PHYSIOLOGY OF VOICE PRODUCTION

*Voice* consists of sounds produced by the vibrations of the vocal cords in the larynx, but this apparatus is not in constant activity and may allow the air to pass without imparting vibrations to it; the conditions upon which the vocal cords do vibrate, causing a musical note, are dependent upon the will. The pitch of the voice is determined by the size of the larynx and length of the vocal cords—hence the shrill voices of children and the higher voices of women. At the age of puberty there is an increase in the size of the male larynx, so relatively sudden that time is needed to regain control about one octave lower and the voice is said to "break"—but this is normal and physiological. Articulate words are not produced in the larynx, which by itself would emit but feeble sounds. The larynx sets in vibration a column of air and this vibrating column of air is formed into articulate speech by

the moulding of the pharynx, soft palate, tongue, cheeks, lips and teeth; such sounds as f, s, t, are produced without the aid of the larynx at all.

*Speech* differs from song in that the former is more limited in compass and pitch, is less sustained as regards pitch, is not confined to the notes of a musical scale, and produces sounds that have not a musical character. Good singing voices have a range of nearly two octaves, exceptional voices three octaves or even more. The vibrations of the conversational voice sounds range between 250 and 3000 cycles per second.

The motive power that sets the vocal cords in vibration comes from the lungs. Inspiration, or enlargement of the chest, is a complex act, brought about by contraction of the diaphragm, elevation of the upper ribs by contraction of the scalene and external intercostal muscles, and by rotation of some of the middle ribs at their articulation with the spine. During inspiration the lungs remain passive, following the dilatation of the chest, but in expiration the active part is played by the lungs, little muscular effort being needed. In forced inspiration or expiration, however, many other muscles are brought into play, including the abdominal muscles. It has been said that women employ costal breathing and men abdominal breathing, but in fact the types of breathing merge into one another in both sexes. Proper management of the breathing is fundamental in good singing, and it is a mistake to imagine that a singer has only to breathe "naturally" to breathe correctly.

#### PRODUCTION OF THE SINGING VOICE

*Singing* requires an increased chest capacity, an increased volume of inspired air, as well as a carefully coordinated management of the chest muscles and the diaphragm, so that the pressure of the expired air may be regulated. A student of singing must be taught how and when to take the air into his lungs, and how to control and direct the outflow when emptying them. Regular exercises in respiration must be practised so as to fill and empty the chest adequately with the minimum of visible effort, and to take the breath, in singing or speaking, without any noticeable interruption of the phrase. The breathing capacity can also be greatly increased by regular exercises.

The *vocal resonators* above the vocal cords—for the lungs are also resonators—are extremely important in voice production, but many people who ought to know better seem to imagine that the nasal sinuses are the most important. In my opinion the nasal sinuses have little or no function as resonators—they are air pads protecting the important structures below them (just as a pneumatic tyre is a better protection than a solid tyre), and probably also the antra act as reservoirs for any overflow of mucus. The resonating cavity is that which extends in an unbroken line from the vocal cords to the lips, comprising the hypopharynx, pharynx, soft palate and mouth, and is greatly variable in size and shape. The laryngeal ventricles have been described as vocal resonators, but their function is more probably



that of pouring mucus—they are abundantly supplied with mucous glands—over the vibrating vocal cords, which require lubricating quite as much as any other hard-working piece of machinery. Upon the proper development and use of the pharynx depends much of the richness, quality and depth of tone of a well-produced voice. The pharynx can be enlarged in three directions: from top to bottom, from side to side, and from back to front. It must be enlarged first from top to bottom, and that can be done only by allowing the larynx to sink, which depends upon the extent to which the lungs are inflated. The greater the inflation of the lungs the more does the trachea sink down into the chest, carrying the larynx with it. The next resonator is the nasopharynx, in which the soft palate is movable but the rest of the structure fixed. The nasopharynx should be developed along with the pharynx, and when the pharynx is fully developed the nasopharynx will be found to be fully developed also. The last resonator is the mouth, and the pitch of the mouth resonator varies with the changes that take place in its dimensions. The palate, mouth, tongue, teeth and lips mould the voice sound into the different vowels. Each vowel sound has a pitch of its own, and there is one position of the various parts of the mechanism of voice production best fitted for the delivery of any given vowel. It is only by skilful management of the parts that this position is achieved, the placing of the lips and the shape of the mouth needing particular attention so that the enunciation may be distinct. Morell Mackenzie said: "Without an artistic enunciation sound loses one of its greatest charms. To a person of taste, a simple ballad sung with feeling and clearness of utterance gives more delight than the finest music rendered by a voice which sounds the notes but murders and mutilates the words."

The so-called "registers" have probably given rise to more controversy than any other subject connected with voice production. Before Manuel Garcia's invention of the laryngoscope the mode of action of the vocal cords was unknown, and it was Garcia who introduced the idea of the three "registers" of the human voice—chest, falsetto, and head; Lennox Browne and Emil Behnke called them the "thick" (chest), "thin" (falsetto), and "small" (head) registers, the thick and thin being again subdivided into upper and lower. Morell Mackenzie simplified this classification into two registers, the *chest*, in which the pitch is raised by means of increasing tension of the vocal cords, and the *head*, in which a similar result is brought about by shortening the vibrating cords; he considered that the terms "long reed" and "short reed" would serve well enough to express the fundamental differences in the mechanism of voice production. It is a mistake to make too much of the "registers", and the voice should and can be trained by cultivating one mechanism throughout the entire compass of the voice. The tones are not the result of the vibrations of the vocal cords alone, but of the vibrations of the air column in the vocal tube and resonating cavities. The more perfect the management of the resonating cavities, the more

readily is the air column subdivided and the richer is the voice in overtones.

The essentials of singing, as Mewburn Levien, the friend of Morell Mackenzie, has long taught, are that the voice should be steady; that the tone should flow out and not be forced out; that it should be clear and carrying and properly focused; that the vocalization should be smooth and at the same time the notes distinct; that the words should be clear; that any gradation of tone should be completely at the command of the singer; and that the voice should not suggest to the hearers thoughts either of the throat or of the nose. In singing, the body as a whole should be relaxed and not in a state of strain. For a singer the breathing should be easy, ample and rhythmical. The singer must breathe through the mouth, not the nose; as there is no time to shut the mouth, breathe through the nose and then get the mouth, tongue and soft palate ready again for the next word to be sung. The air must not be gulped in, but the throat allowed to relax completely and open widely; the mouth should be opened by allowing the jaw to drop a short distance—a space enough to admit the finger between the teeth—by its own weight; an unnecessarily wide-open mouth from top to bottom hampers the action of the throat and makes words more difficult to enunciate.

When singing vowels the soft palate should be drawn up, which gives firm resonance: a relaxed soft palate allows air to get up to the post-nasal space losing firmness and “ring” in the tone of the voice. The tongue may be moved about perfectly freely, as in whispering distinctly, and the singer should not try to keep the tongue flat. The tongue, in the words of Mewburn Levien, “is a partition to be moved about, not a floor to be fixed down”. The mechanism of singing every one of the consonants must be carefully studied, whether the breath comes well forward to the top of the tongue, the teeth, or the lips, or to the back of the tongue and the soft palate. The tone the singer wants depends upon the sentiment he is trying to convey. Singers should study elocution and be good grammarians, marking punctuation by taking breath.

#### LOSS OF VOICE

Singers lose their voices not usually from overwork but as a result of wrong methods of voice production and respiration. The coordination of the brain and the muscles of the larynx tires after overwork (just as do the muscles of a cricketer at the end of a long season), and the voice is forced in an attempt to overcome the feeling of uncertainty due to muscular fatigue. The high notes are usually as good as ever, for in them the tension of the vocal cords is greater, but the singer begins to complain of difficulty in singing *piano* and *mezzo-voce*. Melba was accustomed not to practise her highest notes—she “felt they were present” merely by the general condition of the voice, but used them only on the stage.

*Treatment.*—In the treatment of *acute laryngitis* many remedies have traditionally been recommended to abort the disease, such as aconite, and

to-day the patient is lucky who escapes penicillin and the sulphonamides. I advise veganin (compounds of aspirin are better than aspirin alone), inhalations of Friar's balsam, cold-water compresses around the throat (a grandmother's remedy, but none the less effective), and, most important of all, absolute silence. When a singer or a public speaker has a truly acute laryngitis it is no good trying to get him or her through an engagement, however important, although it takes a good deal of nerve to stop a famous singer from going on the platform at the Albert Hall packed with thousands of people who have paid large sums for their seats. In a milder type, a *catarrhal laryngitis*, the nose can be cleared with an alkaline spray (*not* douche) followed by a mild spray of menthol, eucalyptol and paroline; the pharynx may be painted (once only) with Mandl's paint, and a few drops of adrenaline applied to the larynx with a laryngeal syringe. The "theatrical throat specialists" who made a reputation among opera singers in the past were accustomed to use cocaine and adrenaline sprays to the larynx (usually about 3 per cent. cocaine with a few drops of 1 in 1000 adrenaline), but I have never used a cocaine spray in the throat and would strongly advise against its use.

Like most other laryngologists I have had an actor, actress or singer come to me on the morning of an important first night or concert, having lost the voice, begging me to get them through that particular performance. If the condition was a truly acute laryngitis I have always advised against doing so, on the ground that it is not the one performance that matters but the rest of the actor's or singer's career. When the vocal cords merely show evidence of overstrain, often from prolonged rehearsals (I have known a producer so stupid as to go on with a dress rehearsal until three o'clock in the morning before a first night) I have advised the following regime:—Not a word to be spoken before the performance; bed immediately after lunch, with a cold water compress around the throat; simple, mildly mentholated nasal drops every three hours; stay in bed as late as possible before having to leave for the performance; and one hour before the curtain goes up, have half a bottle of champagne. Sometimes much of the throat trouble is psychological, and I have more than once with my own hands pushed a singer out upon the stage.

A patient with *chronic laryngitis* is nearly always a person who uses the voice professionally, although he is not always a singer or a speaker. "Clergyman's sore throat" is notorious, but schoolteachers are as bad as clergymen, and bookmakers, barrow-boys and regular attenders at soccer matches are professional voice users just as much as singers or public speakers. Noise is an important factor in the causation of hoarseness: talking in an underground train or a bus, or often even in the street, means raising and forcing the voice, and impairing its quality. Some halls have notoriously bad acoustic qualities, but speaking in the open air is the worst form of vocal abuse; the speaker does not get his voice reflected back to him,

feels that he is not reaching his audience, and so puts more force than necessary or desirable into his phonation.

Alcohol in the form of spirits undoubtedly has a prolonged vasodilator effect that is injurious to the mucosa of the larynx; the vocal cords can be seen to be engorged twenty minutes after drinking whisky. Tobacco causes harm to the larynx by its local, not as in alcohol by its systemic, effect; it is not the nicotine that causes harm so much as the burning of the chemical products by the destructive distillation of the burning tobacco. I tell singers with voice trouble that although I cannot stop them smoking I would not personally smoke if I were a professional voice user. Inveterate smokers may be persuaded to smoke only the first third of a cigarette, marking it off.

Search for and elimination of the cause are fundamental in the treatment of all cases of hoarseness, and the diagnosis of "chronic laryngitis" should never be made until all other possibilities are definitely excluded. Chronically infected tonsils can undoubtedly cause chronic pharyngitis and chronic laryngitis and should be dissected out when this seems necessary; many singers are afraid that this operation may spoil their voices, but this fear is quite out-dated. I have known a singer perform at an important concert three weeks after a tonsil dissection. The nose is very important: chronic laryngitis in a singer can persist for months owing to an unsuspected infected antrum dribbling muco-pus down one side of the throat. Resection of a badly deviated nasal septum may give new life and resonance to the voice. Jean de Reszke once said: "La grande question du chant devient une question du nez". Sprays and other local applications should be unnecessary provided the nose is properly performing its functions of filtering, warming and moistening the inspired air.

In the treatment of chronic laryngitis rest for the voice is the first and most important step. It is not of much use to tell the patient not to talk so much; absolute silence, with a notebook and pencil, is essential. In some cases this is impossible, but silence should be absolute from the time he leaves his place of business until he returns. I often tell an actor or a singer not to say a word he or she is not being paid for. Local medication should be bland and non-irritating. I never use ephedrine; menthol is soothing in small doses [ $2\frac{1}{2}$  grains (0.16 gm.) to the ounce], eucalyptol stimulating. Collosol argentum is better than the weakest silver nitrate. The famous "pigmentum Melba" for chronic laryngitis, associated with the name of Milsom Rees, had tincture of ferric chloride as its chief ingredient. A useful prescription for this is as follows:—

R Tincture of ferric chloride .....	30 minims (1.8 c.cm.)
Menthol (dissolved in a sufficient quantity of rectified spirit) .....	10 grains (0.65 gm.)
Novocain .....	3 grains (0.2 gm.)
Glycerin .....	120 minims (7 c.cm.)
Distilled water .....	to 480 minims (28 c.cm.)

There are variations of this throat paint. In "Favourite Prescriptions"

the late Dan McKenzie (1938) gave it as follows:—

R Zinc chloride .....	10-30 grains (0.65-2 gm.)
Hydrochloric acid .....	1 minim (0.06 c.cm.)
Glycerin .....	30 minims (1.8 c.cm.)
Distilled water .....	to 1 ounce (28 c.cm.)

*Singers' nodules* appear at the juncture of the anterior and middle thirds of the vocal cords, are usually, though not invariably, bilateral, and are as a rule fibrous in structure. They are always caused by a bad method of voice production, often by attempting to sing in a compass beyond the natural one of the voice—too many baritones think they are tenors, although sopranos get singers' nodules too. I have known a singer's nodule develop apparently after a single performance, due to strain. Sometimes with rest the nodule disappears again quickly, only to reappear. The best treatment is prolonged rest—three months or more—and then a new singing teacher; but once or twice I have removed a singer's nodule with the galvanocautery, by indirect laryngoscopy under cocaine anæsthesia, and have had the actor or singer back at work in a few days, when the success of a play and the livelihood of the rest of the company depended upon it—I was younger then and perhaps took a chance I would hesitate to take to-day.

#### CONCLUSION

Although nearly all singers realize that a voice must be trained, few public speakers seem to do so. In my experience, musical comedy comedians seem to have the most trouble with their voices: they have usually begun young, had a tough apprenticeship to their profession, and have then found themselves in long-running musical shows, with songs to sing but without ever having been taught how to sing. Singing to a microphone is not, of course, singing at all but a sort of whispering, and the fact that most of the large theatres in London where musical productions are usual are now fitted with microphones—sometimes camouflaged, sometimes blatant—is symptomatic. Nevertheless, I was glad to notice at the Coliseum the other evening that although the microphones had to be switched on for the less important performers the two leading singers did not avail themselves of these adventitious aids; and—so far—they have not invaded Covent Garden, although amplifiers for back-benchers are now installed in the House of Commons.

#### Bibliography

- Cathcart, George C. (1912): "Voice Production"; in Latham and English's "System of Treatment," London.  
 Curtis, H. Holbrook (1896): "Voice Building and Tone Placing," New York.  
 Jackson, Chevalier, and C. L. (1942): "Diseases and Injuries of the Larynx," New York.  
 Levien, J. Mewburn (1940): "Some Notes for Singers," London.  
 McKenzie, Dan (1938): in "Favourite Prescriptions"; *The Practitioner Handbooks*, London, p.207.  
 Mackenzie, Morell (1888): "Hygiene of the Vocal Organs," London.  
 Negus, V. E. (1929): "The Mechanism of the Larynx," London.

# ATOMIC PHYSICS IN MEDICINE

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It has been realized for many years that the discoveries of this century in the field of atomic physics would have important applications in medicine. Development, however, was not rapid until just before the recent war, but at the present time much effort is being expended on such work, the advances of the last few years being quite remarkable. Apart from the well-known uses of radium and X-rays, perhaps the most striking innovation of the first thirty-five years of this century was Hevesey's investigation, in 1923, of the metabolism of lead in plants, using the radio-active form of this element. These experiments of Hevesey's emphasize the most important property of atoms from the viewpoint of medical applications; that is, that atoms of the same element, all having identical chemical and biological properties, may yet have different physical properties enabling them to be identified by physical means.

## RADIO-ISOTOPES

An atom is known to consist of a cluster of negatively charged electrons, held together by the electrical attraction of a positively charged central nucleus. The nucleus carries a charge of the same magnitude as the total negative charge, thus making the atom as a whole electrically neutral. The atoms of one element differ from those of another by the size of the nuclear charge and so also by the number of electrons in the cluster. If the elements are arranged in order of increasing atomic weight, it is found that this charge increases in unit steps from hydrogen up to uranium. All the ordinary properties of the elements, their chemical affinities and their biological reactions, are determined by the magnitude of this electrical charge, and only the electron clusters react in normal physical and chemical processes quite independent of the *structure* of the nuclei. It is possible, however, for the nuclei of two atoms to differ slightly in structure while retaining the same charge and therefore the same chemical properties. Such atoms are known as isotopes. It is, in fact, the general rule that a pure element will consist of a mixture of atoms of different kinds, and incidentally of different weights, but with chemically identical properties. This accounts for the fact that although it is clear that atoms are built of the same fundamental particles, yet atomic weights do not turn out to be whole numbers when the atomic weight of hydrogen is taken to be unity. Chlorine, for instance, has an atomic weight of 35.5, the reason being that normal chlorine is a mixture of isotopes of weights 35 and 37, the proportions being such that the average weight is always 35.5. This is a general rule and with few exceptions the pure elements as we know them consist of mixtures of isotopes. The pro-

portions are, for all practical purposes, constant, and so atomic weights appear to be constant, but it is possible to separate isotopes in particular cases. For instance, two types of chlorine might be produced, chemically the same but separately identifiable by physical means. As will be seen this can be of important help in medical research.

Returning now to Hevesey's pioneer work, he used a radio-active isotope of lead, that is, his lead was indistinguishable chemically from normal lead but the atoms were unstable. The instability in a radio-active atom lies in the nucleus, which may split up quite spontaneously with the emission of easily detectable radiation. In most cases the breakdown of single atoms can be recorded. Radium is perhaps the best known example of a radio-active element. The interesting point is that when an atom of radium breaks up, the emitted radiation consists of constituents of the nucleus which carry away some electrical charge. The atom left then has a smaller charge and weight and is an entirely different chemical substance from radium. It is, in fact, an atom of gas, radon, which has similar chemical properties to the "noble" gases, neon xenon and krypton. A sample of radium is therefore continually changing into another substance lower down the list of elements. In the case of radium the process is slow, half the radium changing in about two thousand years, but there is no known way of altering the rate. Radon itself is also radio-active, and in fact there is a long chain of elements through which an atom, originally radium, passes. One of these is the radio-active isotope of lead mentioned before, and if a quantity of radium is taken and the chemical processes for the extraction of lead performed on it, some lead of the radio-active form is obtained. Now the advantage to Hevesey in using this type of lead in his experiments on lead metabolism was that the most minute quantities can be detected by the radiations emitted, quantities far beyond detection by micro-chemical means. In this way he was able to follow the fate of lead, supplied to living material, with great accuracy.

Although Hevesey's method suggested a powerful means of investigation in physiology and medicine it unfortunately was limited to investigations of the metabolism of the naturally occurring radio-active elements which are few and of little importance biologically. Nowadays, however, it is possible to produce radio-active isotopes of nearly all the elements of interest in medicine, and experiments of the same nature as Hevesey's can be performed with phosphorus, iron, iodine, sulphur, carbon, and so on. This is achieved by the recently developed "atom smashing" machines in which elements are bombarded by radiations so intense that rearrangements in the structure take place, leading in many cases to the formation of radio-active atoms. In addition, however, to the use of these radio-active isotopes as "tracers" they can also be produced in sufficient quantities to replace or supplement the use of radium as a therapeutic agent. This involves either the direct replacement of radium in applicators with a cheaper and possibly

more effective radio-isotope, or the direct injection of some chemically non-poisonous radio-active element (e.g. radio-phosphorus in a phosphate form) directly into the tissue requiring radium treatment. The therapeutic doses required are very much greater than those used in "tracer" experiments. In fact, the great advantage of the "tracer" technique is that good measurements can still be made with doses so small that the radiations are quite harmless and produce a negligible physiological effect.

#### THE USE OF RADIO-ISOTOPES IN MEDICINE

A vast amount of work has been done along these lines in recent years and a complete review would be a lengthy affair. In this article a few isolated cases must suffice to illustrate the use of the new technique.

*Blood banks.*—During the war a large team in the U.S.A., spread over many institutions, tackled problems in blood transfusion and the preservation of whole blood to be shipped from the mainland to the Pacific theatre of operations. A number of possible preservatives had to be tried and the subsequent interactions of preserved blood with various blood types studied. In part of this work *radio-iron* was used as a tracer, being injected into the blood stream and eventually finding its way into the red cells in the form of hæmoglobin. Fortunately, it is possible to produce two radio-active isotopes of iron, both, of course, with identical chemical properties but with vastly different types of radiation, enabling one to be detected and measured independently and in the presence of the other. In these experiments one type of radio-iron was injected into the blood donor and the other into the recipient, so that the red cells of each were easily distinguishable. In this way direct measurement of the usefulness of preserved blood after various periods of storage was obtained. The stored blood was transferred into the recipient, and later on blood samples were withdrawn and measured for content of the two types of iron. From measurements of this sort it was possible to determine what percentage of the preserved donor blood remained active in the recipient, and it was by this method that suitable standards for the storage of blood were set up. In addition to this example it is easy to see other applications of the use of radio-iron; the determination of blood volume, for instance, with obvious applications in surgery and obstetrics.

*Radio-active isotope therapy*, that is, direct injection of radio-isotopes into tissue requiring radiation therapy, is still very limited in its scope but some successes have been recorded. This application depends upon the selective absorption of suitable radio-isotopes into the cells or tissue in question. Recent work indicates that certain cases of *hyperthyroidism* respond satisfactorily to treatment with radio-active isotopes of iodine. Radio-iodine is injected into the patient and because of the great avidity of the thyroid for iodine, especially in conditions of this nature, it is possible to direct the radiations to the inside of the cells which it is desired to irradiate. The



great difficulty, however, in this type of treatment is to determine the optimum dose, bearing in mind the possible long-term effects of the radiations used.

A similar technique has been employed in the treatment of *polycythæmia* using radio-phosphorus with good results, and some relief can be given in cases of chronic myeloid leukæmia. For this disease, however, the method has little advantage over the conventional X-ray treatment. It would seem that further progress in this field of radio-isotope therapy must wait for biochemical work, for very few of the elements or of their inorganic salts are selectively absorbed by different parts of the body. It is, of course, quite a different matter with complex molecules, although here the difficulty is one of introducing a radio-active atom into a complicated molecule with some possibility of its staying there. One important fact that isotope work has shown is that there is a very rapid interchange of the atoms in the body. Even relatively stable tissues such as bone seem to interchange their atoms every few weeks.

It is unfortunate that the only known radio-active isotopes of the most interesting elements biologically, carbon, oxygen and nitrogen, are extremely difficult to work with, but this can be avoided to a certain extent by using a different method. Ordinary nitrogen, for instance, is made up of 99.6 per cent. of an isotope of weight 14 units and 0.4 per cent. of an isotope of weight 15 units. These percentage abundances can be measured quite easily in an instrument called a mass spectrograph. As it is now possible to separate isotopes, nitrogen with, say, equal parts of the two isotopes can be produced. If this is synthesized into the nitrogen compound the metabolism of which is to be studied, its effect in different tissues can be ascertained by extracting the same compound later and measuring the relative abundance of the isotopes of nitrogen in the extract. If this ratio differs from that of normal nitrogen it means that some of the injection has found its way into the tissue and the actual amount present can be calculated from the change in the ratio. Although the method is not so delicate as the radio-active method, yet it has some advantage in that there is no radio-activity present and therefore no possibility at all of interference with normal processes.

#### CONCLUSION

These few examples of the application of atomic physics to medicine will perhaps indicate the extraordinary possibilities of these new methods. Ten years ago such work was just beginning, and relatively little could be done during the war, yet many baffling problems have already been solved in this way. Some eminent authorities have gone so far as to predict that these developments will be as important to medicine as the development of the microscope has been. Whilst this may be an overstatement, it can hardly be questioned that the further development of this technique will vastly increase the knowledge of biological processes and be an important factor in future medical progress.

# FITS IN CHILDREN

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No symptom of disease in childhood is so alarming to parents as a fit or generalized convulsion with loss of consciousness. To the practitioner it should be a cause of guarded anxiety until its significance has been fairly assessed, for the causes and consequences are many and various.

In adults the sequence of events characterizing the "major" fit has since respectable antiquity been described as consisting of a sensory aura, a cry followed by loss of consciousness; a tonic phase and a clonic phase of motor activity, recovery of consciousness and subsequent sleep. In the fits of later childhood it is often easy to recognize all or most of these classical phases, but in infancy, phases may be unrecognizable or in fact elided. It is therefore of some importance to be familiar with the variety of symptom-complexes which must be regarded as infantile convulsions. The practical difficulty at this point is one with which all pædiatricians are familiar, i.e., the difficulty of depending upon an alarmed parent for a history of past symptoms; for it is seldom possible, in the first instance, to see the child in a convulsed state. In my experience the parents' alarm may be of itself of some diagnostic value, for an intelligent mother will almost certainly be aware of her own infant's loss of consciousness, whilst the physiological mass reflex response of a young infant to sudden noise or sudden disturbance, the uncoordinated eye-movement or the clonus of the lower jaw of the normal new-born infant will not strike a mother, and more certainly not a granny, as alarming or unusual. In short, alarmed complaint of convulsions in an infant puts the onus on the practitioner to exclude the diagnosis (that he will often be able to exclude the diagnosis is happily true). This is not to say that many cases of convulsions in infancy may not be entirely overlooked by the parent, cases in which the symptoms are so slight, transitory or localized that diagnosis may be extremely difficult. I have seen cases in which the complaint has been of "blue attacks", "fainting fits", and attributed to teething or wind, but which have been undoubtedly accompanied by momentary loss of consciousness with a fixed stare, convulsive twitchings of short duration or clonic eye-movements.

## REFLEX OR SYMPTOMATIC CONVULSIONS

It must be recognized that one of the important characteristics of the infant's nervous system is its instability, and that stimuli can produce generalized convulsions in normal infants which in older children or adults would produce no such effect. It is not possible to give a complete list of such stimuli, but alimentary disorders due to unsuitable food, infection or in-

festation by worms, and resulting in colic, diarrhœa, and constipation are common. Irritation of the urinary tract, with or without infection, and mild catarrhal middle-ear infection have been frequently associated with convulsions. A sudden rise in temperature, often at the onset of one of the acute specific fevers, may be accompanied by convulsions. It is of some practical importance to remember that the convulsion itself, if severe and prolonged, may raise the temperature of an infant.

The practical problem for the practitioner is to assess, usually after the event, whether the exciting cause was of an intensity to produce the convulsion in a normal child, or whether there is a pathological instability of the nervous system. He must assess, too, the importance of any predisposing factors such as anæmia, malnutrition and debility or heredity in producing the pathological instability, if such exist. Whether in fact anæmia predisposes to fits is, to my mind, extremely doubtful; malnutrition when associated, as it sometimes is, with rickets predisposes to that so-called "spasmophilia" which is now recognized as part of the symptomatology of tetany. Debility, especially after severe diarrhœa in infancy, seems to be a predisposing factor. The influence of heredity will be considered later with epilepsy.

*Organic disease of the central nervous system* is responsible for but a small proportion of cases of fits in childhood; nevertheless, such disease must in every case be excluded and this can only be achieved by a thorough physical examination. It must be emphasized, too, that this generalization is not true of fits occurring in the newborn or in the early weeks of life when congenital defects or birth trauma are common causes. In such young infants fits are often associated with birth injury causing intracranial damage. Such damage may or may not be accompanied by injury of the bones of the skull, and is usually vascular in origin. All grades of intracranial vascular damage may occur from slight and self-limited extravasations of blood to large and uncontrollable hæmorrhages. In the diagnosis of such cases a history of premature birth, perhaps with some precipitancy of delivery, will be of more significance than a history of difficult labour with the application of forceps. Lumbar or cisternal puncture will often provide evidence of hæmorrhage, and the localization of a subdural hæmatoma will call for repeated aspiration and, in some cases, craniotomy for the evacuation of the localized clot before permanent cortical atrophy or porencephaly occurs. Such damage may show itself later as hemiplegia, diplegia, mental defect and fits.

Any of the *acute infections of the central nervous system* may declare itself by fits in childhood. The younger the child the more likely it is that the presenting symptom in acute meningitis, encephalitis, or tuberculous meningitis will be some form of convulsion. The diagnosis of such cases will be confirmed by a study of the changes in the cerebrospinal fluid.

*Congenital defects of development of the brain* causing mental deficiency may also result in fits and, in such cases, when the fits are severe and fre-

quent it is sometimes thought that they are the cause of the mental defect. Although mental deterioration may result from uncontrolled epileptiform fits and frequently does occur in idiopathic epilepsy, the associated inborn mental defect is a far more common finding in childhood.

*Congenital neurosyphilis* is commonly insidious in its development, and the first indication of its presence may be the occurrence of fits. Other signs of neurosyphilis, such as deafness and retinitis, or of the generalized disease in bones, skin and viscera should be sought, but positive findings in the cerebrospinal fluid will clinch the diagnosis.

*Intracranial tumour* (and tuberculoma) may be accompanied by fits although other signs and symptoms are usually prominent. It is a mistake to suppose that such fits, when they have a "focal" or "Jacksonian" character, are of any value in making a diagnosis of the locality of the lesion.

Fits in childhood due to *asphyxia* may be the result of a functional obstruction of the air passages such as occurs in laryngeal spasm. Again it is relevant to remark that the tonic stage of the major fit is itself the cause of asphyxia, and it is not always easy to distinguish between that which a parent calls "a choking fit" and a fit which causes "choking". One of the more common causes of laryngeal spasm in children is whooping-cough and, in the absence of history of the characteristic inspiratory whoop, the diagnosis may be difficult to establish without laboratory help. From the clinician's point of view it is helpful to remember that a child seldom makes as many as six expiratory coughs without intervening inspiration except in whooping-cough.

Laryngeal spasm and cyanosis sufficient to produce a fit may form part of the syndrome of tetany when it is known as laryngismus stridulus. In "spoilt" children asphyxia of sufficient severity to produce fits may result from breath-holding. In such an attack the child has usually lost his temper and begins to cry; after one or two bellows he draws in his breath and respiration then ceases and the child goes blue in the face. If breathing is not resumed loss of consciousness and a generalized fit may follow. The best treatment of this morbid habit is prevention by startling the child by a sudden unexpected slap or a dash of cold water in the face. The success of such treatment depends upon it surprising the child and this must be explained to the parents. Warning the child that he will be slapped if he doesn't breathe, or routine sponging of the face with cold water is of course useless. It is the inspiratory gasp of surprise which ends the attack.

#### EPILEPSY

A large proportion of cases of idiopathic epilepsy start having fits in childhood. It is important therefore that this diagnosis should be considered whenever a child has an epileptiform attack.

*Diagnosis.*—After excluding the many causes of symptomatic convulsions and considering the family history (although some authorities consider that

the heritable qualities of epilepsy have been much exaggerated) the past history of convulsive disorders must be investigated. One of the points essential to a diagnosis of epilepsy is that the fits recur and this makes it extremely difficult to make the diagnosis when fits first appear.

In epileptic children both major and minor fits are seen. The major fit has already been described. The minor attack (*petit mal*) varies widely in character and in duration. The loss of consciousness, momentary or lasting a few seconds, is perhaps the most significant factor leading to a diagnosis in older children. They are often able to describe how, when listening to a lesson in school, a spoken sentence or half a sentence "goes a-missing". Preceding the loss of consciousness there may be a sensory aura and this sometimes is described as a feeling of giddiness or abdominal discomfort. More often, although there seems to be a vague warning of the attack, the child is unable to describe it. With loss of consciousness there may be a fixed stare or upturning of the eyes. Any twitching movements in the course of the attack connote, strictly speaking, a major attack and, in such cases, the diagnosis of *petit mal* is inaccurate. But the point is academic, and it is not always easy to say whether clonic movements have occurred or not.

*Pyknolepsy*.—This uncommon condition consists of *petit mal* attacks of great frequency. The attacks often occur every few minutes and are not affected by treatment. They cease spontaneously, usually about the age of puberty.

The use of the electro-encephalogram (E.E.G.) in the diagnosis of fits in children has been limited in the past by technical difficulties. These have been largely overcome and in skilled hands the E.E.G. is of value. Dr. Denis Hill, in a personal communication, states that spike and wave activity is evidence of epilepsy at any age and is often seen in the first years of life in those who later become true epileptics.

"One important thing about the E.E.G. in epileptic children is that the spike and wave complexes, or variants of these complexes, occur about three times as commonly as in adult epileptics, and therefore the E.E.G. is of diagnostic value in determining whether any given patient's 'attacks' are epileptic or not. Another point is that repeated E.E.G.s at weekly intervals provide about three times as much information as a single test, and lastly, it is as well to have the test done with the patient in the fasting state (four hours)".

#### TREATMENT

*Immediate*.—The treatment of an actual fit consists essentially of sedation. During the fit the time-honoured immersion in a warm bath with a cold compress to the head certainly does no harm. In severe cases inhalation anaesthesia may be needed; in most cases chloral, 10 grains (0.65 gm.), per rectum to a child of 1 year, will be effective.

When the fits are due to tetany they can be brought under control rapidly by raising the blood calcium to normal level. This is best achieved by giving calcium chloride, 4 gm. (about 60 grains) in 10 per cent. solution, by gavage,

and following this by 15 grains (1 gm.) three or four times a day for several weeks. In the meantime energetic-antirachitic treatment must be instituted.

*General.*—In the treatment of convulsions of the newborn fairly heavy sedation will be needed, and this can best be achieved by giving phenobarbitone,  $\frac{1}{8}$  grain (8 mgm.) by mouth six-hourly, or chloral, 1 grain (65 mgm.).

Lumbar puncture, performed for the diagnosis of intracranial hæmorrhage, has a beneficial effect in those cases in which a bulging fontanelle indicates increased intracranial pressure. It should be performed with caution as the release of pressure may restart the bleeding.

In symptomatic convulsions the cause should be sought and treated.

*Epilepsy* in childhood must be brought under control by use of bromides and the barbiturates; children tolerate the latter very well. Suggested doses of phenobarbitone are: in infancy  $\frac{1}{8}$  grain (8 mgm.); at two years  $\frac{1}{2}$  grain (32 mgm.), at five years  $\frac{1}{2}$  to 1 grain (32 mgm. to 65 mgm.). These doses can be given two or three times in the twenty-four hours. If there is any daily rhythm in the time of the fits the dose should be given so as to anticipate the fit. Dosage should be maintained for at least two years at the minimum level which is found necessary to abolish the attacks. A cautious and gradual reduction of dose should then be attempted.

The management of the epileptic child's life, the question of schooling and the indications for institutional care are points of great importance about which it is difficult to generalize; the individual's needs and capabilities differ widely and the programme must be planned to fit the circumstances peculiar to each case.

It may be said that an ample diet of easily digested food is needed and that, whilst all points of general hygiene need attention, the regular action of the bowel is a point of particular importance as constipation often results from the action of the sedative drugs.

On the assumption that there is an underlying nervous instability a quiet, unexciting routine is indicated, and is found to suit such children well. All breaks of routine which cause excitement, even when such give obvious pleasure, are best avoided. It will be clear that such a regimen cannot be achieved in an ordinary school or, indeed, at home, if the patient is one of a large and healthily exuberant family. The question of providing a suitable environment, in special school or colony, will therefore have to be considered in all those cases in which the epileptic symptoms cannot be brought under control without stupefyingly large doses of sedatives or unwarrantable interference with the happiness of normal children.

# THE TREATMENT OF PSYCHOLOGICAL CONDITIONS IN GENERAL PRACTICE

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The common error in dealing with the neuroses is to assume that these conditions inevitably imply atrophy of will. For this reason the patient is commonly exhorted to "pull himself together". This may be useful in some types of hysteria. Unfortunately, to many doctors of the bluff, "practical" category, all nerve cases are hysterics. To tell an overconscientious obsessional, who has fought his compulsive thoughts for years and in secret, to pull himself together, is not only stupid and cruel, but positively dangerous. Again, in early melancholia, patients are often intensely depressed, without initiative for their work or zest for their pleasures, and torture themselves with ideas as to their own worthlessness, even though they have led the most circumspect and useful lives. If an effort of will would enable these unfortunates to escape from their sufferings, is it not only common sense that they would avail themselves of the advantages to be derived from such a trifling expenditure of energy? Many of these self-accusatory cases are suicidal. The "pull yourself together" attitude can only intensify the self-accusation which is one of the factors prompting the impulse to self-destruction.

When the impatient doctor is weary of indicting the will, he is almost certain to accuse the imagination: "It's all imagination." It practically never is. Speaking generally, neurotics cannot be said to be more imaginative than non-neurotics. These vague and ubiquitous symptoms of which the patient complains are really felt by him. If he is told that what he feels does not exist, his faith in you is sapped to a degree which renders you more or less useless to him. And, of course, a great deal of this "peculiar sensation business" is not neurotic at all. Many of the chest and solar plexus sensations of which a patient complains are due to dysfunction of the autonomic nervous system, for which a little belladonna and luminal are indicated. In particular, I constantly find certain vasovagal phenomena labelled as neurotic. I do not deny that many of these cases are complicated by neurotic factors, but I often wonder to what extent we have helped to induce a neurosis by our misconception of the nature of the symptom complex. We should be careful that we do not increase the psychological problems of our patients because we have forgotten our own physiology.

Another cardinal error in dealing with neurotics is to exhort them too earnestly to get their minds off their problem and think of something else. They are only too willing to do so. It is for this reason that they have sought advice. They cherish a hope that the doctor may even be able to aid them

in this laudable ambition. Indeed, the essential feature of an obsessional reaction is that the patient *cannot* get his mind off his problem. Obsessional thoughts obtrude on the patient's consciousness against his by no means atrophied will. I have seen many such cases nervously prostrated by attempts to fill their minds with thoughts other than those abnormal preoccupations which force themselves on their victim's attention. It is a far less dangerous policy to tell the patient that he must accept such thoughts for the period of his illness.

Many doctors encourage their neurotics to forget themselves—at its best a counsel of perfection—in work for others. This may be good advice in some egocentric and selfish hysterics: it is definitely bad when applied to the obsessional or the incipient melancholic. The latter are too often over-conscientious and overscrupulous in their efforts for their fellows. To give such advice to them is merely to increase their already morbid concept of their social obligations. They need rather to be encouraged in simpler and, if you will, more selfish pleasures. In psychological, more even than in general, medicine the individual must be treated rather than the symptom complex he presents at any given moment.

The doctor with little time for neurotics belongs often to what William James called "the tough-minded category". If, in addition, he is an Anglo-Saxon or a Scot, he is probably attracted to a toughening régime, including the inevitable prescription of exercise. I am far from belying the value of the latter: I prescribe it often myself. But in states of acute anxiety when the patient's mental and physical resources are being consumed by the intensity of the disease process, such a prescription is blind and foolish. I cannot emphasize too strongly that the peaks of anxiety, whatever the disease category against the background of which they occur, must be regarded as physical illnesses and, as such, require the prescription of rest in bed.

But the tender-minded and too sympathetic attitude found sometimes among practitioners has, too, its special dangers. The doctor suffering from thwarted maternal feelings is apt to protect his patients too much from the ordinary stresses of existence. There is no greater error than to encourage a patient to believe that he or she is a person of unusual sensitivity who requires to be handled in a subtle and picknickety fashion known only to the angels or her charming doctor. The proportion of doctors sufficiently foolish to say so much in words must be very small, but they do exist. I regularly encounter patients who have been told by their doctors, usually several years back, that their nervous systems are unusually fine and sensitive mechanisms, which cannot be expected to stand up to ordinary wear and tear.

Another sin of the too tender practitioner is his capacity to prolong indefinitely the period spent by the patient away from work. Long periods of rest are, speaking generally, more justifiable in the cases of patients from the professional and administrative classes. Here the patient's malady may



inhibit him for a long time from reassuming, without damage to himself, the degree of personal responsibility entailed by a profession. With the poor patient, employed in a more servile and mechanical capacity, prolonged unemployment, unless at the time he is receiving constant and concentrated treatment, serves only to add financial worry to his other burdens.

Beware of the transference of the female patient. Roughly speaking, this may be defined as the shifting over of the dependent love the patient once had for her father to the unhappy doctor. I say unhappy, because to the specialist this is a stage at which he groans inwardly. The general practitioner, less familiar with this phenomenon, is likely to regard as an improvement something which is a mere phase in the patient's illness. It is easy to describe a patient as better because she thinks you are marvellous. Equally, when she begins to hate you, it is only human nature to believe her condition has deteriorated when, in actual fact, it is probably much improved.

#### PHYSICAL FACTORS

Another error to which the general practitioner is prone is to investigate too minutely the patient's physical condition. An ordinary clinical examination should not be omitted, but if he should suspect that the condition is primarily neurotic, though masquerading as physical, he should plump for a diagnosis of neurosis. If he is still unhappy he should call in the psychiatrist. To work through the whole gamut of cardiological and electrocardiographic investigation, and to give at the end a negative diagnosis, is, in the case of a neurotic patient, to help to fix his symptoms.

Care must also be exercised in order to prevent over-stressing the importance of physical factors and, in particular, chronic infections in the genesis of psychological disorders (I am, of course, not referring to clear-cut mental diseases of specific causation, such as general paralysis). Some years ago oral sepsis had an excellent run as a possible cause of mental disturbance. It may be of some importance in the activation of symptoms in those of depressive constitution. Speaking generally, the only chronic infections of tangible importance in aggravating, or activating, psychological disorder are those of the sinuses and antra. Bad prolapse, vaginal and rectal, particularly in young women, is also an important factor in precipitating neurosis. Such mechanical defects are, in my view, not remedied quickly enough. Of the common acute infections, influenza has a grossly *under-estimated* importance in producing depressive states. Apart from these conditions the general practitioner is not likely to encounter very often many physical maladies which precipitate at any rate *psychoneurotic* disorder. Naturally, the anxiety states accompanying thyrotoxicosis must not be overlooked, but full-blooded hyperthyroidism is not met with every day of the week, and in the majority of cases displaying some degree of thyroid over-secretion the latter is an effect of anxiety rather than its cause.

Instead of searching for physical causes for psychological illnesses the practitioner will be better employed in studying the physical reactions of emotional causation. This new field of somatic medicine affords an escape from the stultifying materialism in which our profession has floundered too long.

#### THE FACTOR OF SEX

As sexual frustration is so important a factor in the development of many neuroses it is necessary to give the subject of sex special mention even in an article dealing only with the superficialities of psychiatry. Many a patient's gross ignorance of the physiology of sex is so astounding that the simpler the enlightenment the more likely is he to benefit from it. People still exist, and in higher numbers than is often suspected, who believe that masturbation is a dangerous mental and moral perversion with dramatic consequences to the individual, such as insanity and softening of the brain. But even among those unaffected by such calamitous ideas the misconceptions as to sexual function are widespread and dangerous. Indeed, I would say that at least 80 per cent. of married people below the level of the *petit bourgeoisie*, practice *coitus interruptus*, believe that sexual energy is something to be stored carefully and used parsimoniously, and assume without questioning that although intercourse occasionally is necessitated by some mysterious force called nature, it is nevertheless weakening. By endeavouring to correct patients' views on these matters more will be accomplished than by the most intensive study of the Freudian symbolisms. *Coitus interruptus* is, in particular, a most potent factor in producing anxiety states, particularly the anxiety hysterias. Many neurotic conditions are precipitated by the man or woman deliberately refraining from coitus, despite the existence of strong desire, because of what is called "consideration" for the other party.

A somewhat homosexual race is finally waking up to the fact that its womenfolk merit a little consideration in these matters. But I do not think that the necessity of stimulating the female prior to intercourse has yet permeated to what are called the lower classes. As a result of this we commonly encounter the husband suffering from a chronic anxiety state or blowing up into an agitated depression. His wife, he complains, has never responded. Nor can she be expected to do so in view of the crudity of his approach to her. The effects of sexual abstinence in women are infinitely graver than in men. Whereas by sexual deprivation the man runs principally to the neurotic states accompanied by anxiety and repression, the woman has at least three main alternative methods of response. She, too, can produce an anxiety state. She can, especially if she is young, react hysterically. Thirdly, she can reserve herself to the climacteric and produce a full-blown psychotic disturbance as a consolation prize for a life of inadequate sexuality.

It is impossible to over-estimate the damage done by Puritanism in this country. A very large proportion of the neurotics I see derive from homes where flourishes that black protestantism which frowns on pleasure in

general and sexual gratification in particular. These people grow up with a sense of guilt about sex which darkens their whole life and is the most important of all the single factors contributing to neurosis.

While correcting the effects of sexual repression, a due sense of proportion must be preserved. Some people are born with a low sexual potential; others are so massively inhibited that their very inhibition has become a protective part of their psychological structure. Many patients can be recognized at sight as pre-ordained male or female spinsters. I have dwelt on these sexual questions because the simple instruction they necessitate can be given equally well by the general practitioner as by the specialist. To the latter should be left the anomalies of sexual function and the cases of impotence; they require special handling and more time than can be spared in general practice.

#### THE VALUE OF EARLY TREATMENT

We hear a great deal about the importance of early treatment in psychological disorders. The general practitioner sees these cases first, and in a more considerable proportion than specialists are prepared to admit, he can cope with them adequately if he knows his job. Hysterical states, involving paralysis or paræsthesia of a limb, require for their correction simple explanation, reassurance and persistence on the part of the physician in restoring function. There is nothing here that the specialist can do better than the intelligent practitioner. Indeed, the latter is, if he knows what he is up to, in a better position than many specialists, who only see the patient when symptoms are well established. Similarly, cases of hysteria in which emotional display is a paramount feature can be dealt with by the general practitioner. This indeed follows logically from the fact that in any case they ought to be coped with by the first doctor who sees them. The same applies to such brief anxiety states as, for example, followed severe bombing with burial under debris, in people with a previously sound psychological history. I see no reason why the treatment of more prolonged anxiety states cannot at least be attempted by the general practitioner, provided he is prepared to bring to light the frustration of the sexual or self-expressive tendencies which are so often at the basis of such reactions. Leave the anxiety states complicated by special phobias, such as claustrophobia, to the specialist. Do not touch the obsessional with a barge pole until he has seen, and you have talked with, a psychiatrist.

#### DRUGS AND MEDICAMENTS

I should like to mention one or two common errors to which the general practitioner is prone in prescribing drugs in psychological cases. I do not think he keeps on with his sedatives sufficiently long in his acute cases. After all, the great majority of neuroses which he encounters last at least for several weeks. It is quite useless to stop a sedative, above all to stop it

suddenly, after a period of two or three weeks, because the patient is feeling better. Remember also that the patient with acute anxiety should be given a sedative during the day as well as at night.

Another common fallacy is to continue plugging the patient with what are called, in the classical sense of the word, tonics. Preparations containing arsenic, strychnine, and the like, are not indicated except in neurasthenia, which, in the strictest sense of the word, is the rarest of all psychoneurotic maladies. The nervous system of the average neurotic needs sedation, and stimulation can be actively deleterious.

#### THE NERVOUS CHILD

I have not as yet mentioned what is possibly the most important duty in relation to psychological medicine. I refer to the management of the nervous child. This is in itself a vast subject and I will restrict myself to mentioning what I consider to be the primary requisites for happy childhood. These can be summarized in a single phrase. The child must feel secure. This can only be effected in an atmosphere which is not only charged with affection but where affection is openly manifested. But there are other requirements of first importance. Children should not be sacrificed on the altar of their parents' ambition. Comparison with the academic and athletic achievements of other children should be rigidly eschewed. The acquisition of academic knowledge should not only be deplored in the young but is to a large extent a vain policy, seeing that true idea formation occurs only at and after puberty. As a general rule, no child, except only children, should begin school before the age of six.

A far too high standard of conduct and manners is expected of young children. Among the most accursed of parents are those who, themselves in the process of social advancement, desire their children to be little ladies and gentlemen at the age of four. In their early years human beings are by nature animals, and if prevented from so being are apt to become neurotic or asocial at a later age. The aim of parents, for children up to the age of at least seven, should be to ensure that their offspring enjoy themselves as much as possible in whatever way they choose, provided they avoid inflicting pain on others. I am only too painfully aware that there is a contrary view which asserts that the best upbringing errs on the side of severity. I have neither the space nor the inclination to argue the point. I shall content myself with two comments. It has been my experience that those who break down in adult life are far more commonly those who have received a strict upbringing. Again, I have often been told, "I believe in strict discipline. That is what my father gave me and that is what I propose to give to my own children". I have never been impressed with the nervous stability of those who have made such statements. Furthermore, I have marvelled at the lack of logic which enables a man to enunciate such opinions at the same time as he is exhibiting his neurotic offspring for my inspection.

# POST-ANÆSTHETIC VOMITING AND CHEST COMPLICATIONS

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## VOMITING

THE factors to be taken into account are :—

- (1) The idiosyncrasy of the individual patient
- (2) The preparation and premedication
- (3) The nature and length of the operation, and depth of anæsthesia required
- (4) The skill and experience of the administrator
- (5) The actual anæsthetic agent used (in many ways the least important factor)

*The idiosyncrasy of the patient.*—Women are more affected than men. Many patients will vomit or attempt to retch on the very least provocation. Thus a nervous woman about to have a simple dental extraction will sometimes attempt to retch immediately a face-piece is placed in position. The patient who is always sea-sick, or train-sick, will be predisposed to post-anæsthetic vomiting. I have also found several patients with a history of migraine who vomited after anæsthetics.

*Preparation and premedication.*—Naturally the patient who has recently had a meal, or even a hearty drink, will vomit more easily than one whose stomach is empty. On the other hand, excessive starvation and purgation encourage post-anæsthetic vomiting. A light meal, such as a cup of tea (with liberal amount of sugar) and dry toast, three-and-a-half hours before operation does no harm. The patient prepared for a couple of days with doses of glucose will be in a better position than one without such preparation. Moderate doses of an alkali also give some protection. Some authorities give 15 to 20 units of insulin as a protection against vomiting. This is given about two hours before the time of operation.

Far too little attention is given to premedication. A sleeping draught of potassium bromide, 20 grains (1.3 gm.), and chloral, 30 grains (2 gm.), should be given the night before operation. On the morning of the operation omnopon  $\frac{1}{2}$  grain (22 mgm.), hyoscine  $\frac{1}{150}$  grain (0.43 mgm.), atropine  $\frac{1}{100}$  grain (0.65 mgm.), should be given one-and-a-half hours before the time of operation. Morphine should never be used, as it is often the cause of vomiting. The time of the injection is most important. The full effect of the omnopon and hyoscine will not be felt for an hour, and this will often enable the patient to get a good sleep, and to come to the theatre drowsy, yet with the effects of the drug wearing off. If the dose be given, say, three-quarters of an hour before operation, the full effects of the drug will be felt at the

same time as anæsthesia is being induced. Again, all effects of premedication should have ceased by the time the operation is concluded. Nothing is worse than to put the patient back to bed still semi-stuporose from his premedication. The above dose of omnopon and hyoscine should be halved for the aged and for women.

*The nature and length of the operation, and the depth of anæsthesia.*—Some E.N.T. patients vomit because blood has leaked into the stomach while they were still unconscious. During abdominal explorations all the viscera may have been somewhat heavily handled, and some patients may have blood in the stomach from a gastro-jejunostomy. Operations of considerable length are apt to cause more vomiting than those of shorter duration, and this is accentuated if the anæsthesia is kept in a deeper plane than is really necessary. Many people are kept down in plane 3 who might well be lightened to plane 1 for considerable periods. Third plane anæsthesia can only be obtained at a cost to the patient. Here the experienced anæsthetist is able to demonstrate his ability.

*The skilled administrator* will have the whole body under his careful observation. He will be able to foresee the surgeon's next move, and will know just what steps to take in order to have complete control of the anæsthesia. He will not make use of his gas-oxygen as a vehicle to drive ether vapour into his patient's lungs. He knows when he can cut off ether altogether, and carry his patient along on gas-oxygen at a stage where he will accept ether without coughing and straining, as and when it becomes necessary. Large, and unnecessarily prolonged doses of ether are one of the most potent causes of post-anæsthetic vomiting. The modern closed circuit CO<sub>2</sub> absorption technique enables the consumption of ether to be cut down enormously with no loss of efficiency.

*The anæsthetic agent.*—Small doses of cyclopropane may be used instead of ether, or relaxation may be obtained by divided doses of intravenous pentothal or tubarine. Much assistance can be obtained from light trilene anæsthesia when actual muscular relaxation is not required. After a whiff or two of trilene the most difficult patient will accept ether without a murmur. It must never be forgotten that closed circuit CO<sub>2</sub> absorption must never be used while trilene is being administered.

For long operations requiring maximum relaxation, as, for instance, partial gastrectomy, and abdomino-perineal resections of the rectum, light nupercaine spinal anæsthesia is probably ideal. Spinal anæsthetics are often followed by vomiting, and post-anæsthetic headache is by no means a negligible risk. It is best to induce with pentothal, and carry on with gas and maximum oxygen. Pentothal would appear to give some protection against headache.

It is as well to remember that you cannot obtain relaxation of muscles under spinal anæsthesia without relaxation of blood vessels as well, hence a careful watch must be kept on blood pressure. There can be little doubt, however, that perfect muscular relaxation eliminates much of the rough

handling of viscera that must necessarily take place with less perfect relaxation. The rough handling may often prove a potent cause of post-anæsthetic vomiting, or even of acute dilatation of the stomach, which so often ends fatally. Peristalsis, under spinal anæsthesia, instead of being reduced, as with chloroform or ether, is increased. Indeed, it is said that there is a risk of rupturing the gut when spinal anæsthesia is used for strangulated hernia. Anoxæmia, if allowed to exist for any length of time, may damage the liver, or at least affect its function for a time, and thereby predispose to vomiting.

The more toxic the anæsthetic agent used the greater the risk of vomiting. Chloroform and ether usually cause most vomiting. The more rapidly the anæsthetic is excreted from the system, the less the risk of vomiting, hence the fact that gas-oxygen causes least vomiting. Cyclopropane has little or no effect on the liver or kidneys and is rapidly eliminated from the system; but the first hopes that this agent would not cause post-anæsthetic vomiting scarcely seem to have been fulfilled. Most supporting anæsthetics, such as ether, trilene, cyclopropane, should be shut off at least ten to fifteen minutes before the end of the operation, or immediately the peritoneum is closed. The patient can then be carried along on gas-oxygen and later given CO<sub>2</sub> and air. CO<sub>2</sub> and air is much preferable to CO<sub>2</sub> and oxygen, which is too rapidly absorbed in the alveoli and may predispose to atelectasis; also there is a risk that the patient may be returned to his bed in a state of apnœa.

Post-operatively, morphine should be withheld unless absolutely necessary; heroin, or even simple veganin by mouth, will often prove sufficient.

#### POST-OPERATIVE PULMONARY COMPLICATIONS

Although vomiting is the most frequent post-operative complication after anæsthesia, there is no doubt that pulmonary complications are far more frequent than might be thought. Recent statistics put the figure as high as 6 to 9 per cent. The most common forms are:—

- (1) Bronchitis
- (2) Atelectasis
- (3) Broncho-pneumonia
- (4) Pulmonary abscess

The first three forms are most commonly met with, particularly bronchitis and broncho-pneumonia. Pulmonary abscess is most prone to follow an inspiration pneumonia; modern anæsthetic methods (endotracheal tube with continuous nasal suction) have greatly reduced its incidence.

Men suffer from post-operative chest complications more than women, probably because they are heavy smokers, and also because they require more anæsthetic. It has been said that older people suffer more than younger ones, but I cannot say that this has always been my experience. I have had most cases among the twenty-five to thirty year old service man. Naturally the winter months are worse for chest complications than the summer. Children are prone to "develop chests" after quite small operations, particu-

larly guillotine T's and A's. Many people have started colds before operation and far too little notice is taken of this. It should be a definite rule that any non-urgent operation should be postponed on this account.

Statistics show that post-operative complications are common after spinal and local anæsthesia. This statement is hardly a fair one to make, as such anæsthetics have probably been chosen because the patients are already "chesty". The *predisposing causes* are many and varied. They are:—

- (1) The agent used and the technique
- (2) The nature of the operation
- (3) The position on the operating table
- (4) The amount of operative shock

*The agent used.*—As with post-operative vomiting, the agent used does not matter nearly as much as the skill of the administrator. Ether used to get all the blame. It would now seem that a well administered gas-oxygen-ether with closed circuit is as safe as any other anæsthetic for the chesty subject. Clumsily given ether, on the other hand, with the patient far too deeply anæsthetized, is a common cause. Strong ether vapour can actually damage the respiratory tract. Ether also lowers resistance and thereby aids pulmonary infection.

Trilene is one of the least irritating anæsthetic agents, but it is no use when muscular relaxation is required. For orthopædic work, herniæ, tonsillectomy, mastoid, and short brain operations it is ideal.

For the ill patient already "chesty" cyclopropane is the best of all anæsthetics. It is possible to administer large quantities of oxygen with it. There is, however, more risk of atelectasis after cyclopropane and oxygen, even in the most skilful hands.

Vinesthene is useful in children but should not be used for operations of long duration.

The endotracheal technique would seem to give some protection. Chest complications seldom follow E.N.T. operations, and the majority of these are done under endotracheal anæsthesia. Careless administration of gas-oxygen, with too little oxygen, can predispose to pulmonary œdema in old people. An obstructed air-way in elderly patients if unnoticed for some time can also cause this.

*The position on the operating table.*—Long periods in the Trendelenberg position, particularly in the case of fat women, or in the gall-bladder position with the bridge up, are often followed by chest trouble. In the kidney position the patient lies on one lung, and thereby puts it at least 50 per cent. out of action. The surgeon will probably put a large retractor in the wound, and thereby hamper the efficiency of the other lung.

Profound *shock* during operation is a prevalent cause of pulmonary complications. The circulation becomes sluggish and the lungs suffer from oxygen lack. Careless timing of premedication may cause the patient to be returned to his bed still suffering from the effects of pre-operative morphine.



One other point about pre-operative treatment. The average pipe-smoking man is accustomed to get up and clean his teeth, and have a good cough and expectorate first thing every morning. This he should be encouraged to do on the morning of his operation, before he is given his premedication. There is no doubt that allowing people to remain half doped from the night's sleeping draught until the time of their operation may be a contributory cause of atelectasis. These cases of atelectasis are said to be not uncommon when percentages of about 80 per cent. oxygen are administered for considerable periods. It develops quite suddenly when the patient has been breathing highly absorbable gases such as those that compose anæsthetic mixtures. If larger amounts of nitrogen or of helium are present in the lung, absorption of the gas may be slow enough to delay complete collapse for several hours. A mixture of 80 per cent. helium and 20 per cent. oxygen is now put up in cylinders, and this can be used instead of pure oxygen.

The use of atropine reduces salivary secretion during induction of anæsthesia, but it is possible that it may be responsible for excessive drying of secretions so that they become so tenacious that the ciliated epithelium is unable to move them up into the trachea. At any rate it should be a warning against the use of atropine post-operatively for chest complications.

Amongst *post-operative causes* are:—

- (1) The needless prescribing of post-operative morphine
- (2) Poor position in the bed
- (3) Too deep a plane of anæsthesia at completion of operation
- (4) Tight bandaging of the abdomen

*Post-operative morphine.*—Some young surgeons, and especially house surgeons, make a routine of ordinary morphine for the night of operation. This is often quite unnecessary. A little restlessness and kicking about in bed will probably do good. Heroin, or veganin by mouth, will often be quite sufficient to dull any pain.

*The position in bed.*—Whenever practicable patients should be propped up in bed as soon as they recover from the anæsthetic.

I recall one young surgeon who used to grumble a lot about his patients becoming "chesty" after hernia operations. One day when visiting the ward I discovered the reason. They were all compelled to lie flat in bed with the feet of the bed raised on blocks for two or three days after operation.

A careless anæsthetist may not *lighten the anæsthesia* towards the end of operation. This occurs from inattention and allowing the mind to wander; an inexcusable failing. The pharyngeal reflexes should have returned by the time the patient leaves the theatre. The lungs should be well inflated with air and  $\text{CO}_2$ . Oxygen should not be used as it is too easily absorbed.

*Tight binders or bandages* are sometimes applied after abdominal operations, and these may be so tight as to hamper movement of the diaphragm. This causes stagnation at the bases of the lungs.

Breathing exercises before and after operations are not made as much use of as they should be.

# PAIN AND ITS PROBLEMS

## XII.—THE SURGICAL TREATMENT OF PAIN

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THE surgical treatment of pain is a more complicated matter than mere section of the sensory tract above the site or presumed site of origin of the pain. Pain is a functional manifestation for which several factors may be responsible, and it is the business of the surgeon to unravel those factors. Some pains are of vasomotor origin, due to vasoconstriction or passive vasodilatation, some seem to be of endocrine origin, in some a cerebral factor appears to be at work, as is proved by their disappearance after leucotomy. Diffuse pain may be due to a local cause, sometimes so small and difficult to identify that it seems unlikely to be responsible for the degree and extent of pain experienced. However, in all obscure painful states, a local cause should first be sought, and, if found, should be treated before any indirect operations on the pathways of pain are considered. The following examples illustrate this point:—

(1) A male patient suffered for eighteen years from a diffuse pain in the right shoulder that resisted every form of treatment. X-ray examination showed no abnormality in the bones, and a ganglionectomy or posterior root section was being considered. On re-examination a small swelling was noted under the right deltoid. Incision at this point revealed a small bursa, containing a fibrinous loose body. The bursa was removed, and the patient was relieved of pain and has had no recurrence in eight years.

(2) A man received a gunshot wound in the shoulder in 1915, the bullet grazing the humerus. Eighteen years later he complained of a diffuse burning pain in the shoulder, arm and neck, and of a sensation like melting lead under the skin. Every form of treatment was tried for three years, without any improvement, and resection of the stellate ganglion was being considered. A skiagram, however, revealed a small cavity in the humerus, with a shadow in its centre. The cavity was opened, and found to contain a small piece of bone and some debris. This simple operation afforded complete relief, and ten years later the patient remains free from pain.

(3) A male patient complained of burning pain in the leg and thigh, from which he could obtain no relief. The pain seemed to radiate from a point in the upper part of the leg within a finger's breadth of the head of the fibula. At this site a definite point was found, pressure on which caused the pain. At operation a small glomus tumour, the size of a pin-head, was found under the aponeurosis and removed, with complete relief of the pain.

### ABERRANT PATHWAYS OF PAIN

One factor in the vagaries of pain is that painful sensations may travel along unusual pathways. In patients with arterial disease, for example, it may be found that the spinal anæsthetic administered for lumbar sympathectomy, which allows this operation to be carried out painlessly, has no effect on the pain in the toe from which the patient is suffering; yet after section of the splanchnic nerve or ganglionectomy the pain disappears.

These findings prove that pain may travel along the artery, a view confirmed by an old observation by Temple Fay.

"Following a double chordotomy at the fourth thoracic segment, a tabetic was forced to undergo a laparotomy for obstruction. The layers of the abdominal wall and the parietal peritoneum were absolutely free from pain, but manipulation of the intestines proved very painful. In this case the pain fibres passed along the aorta to reach the spinal cord above the level of the chordotomy."

Certain observations seem to establish the fact that, following section of the spino-thalamic tract, other pathways may take on the function of those that have been divided.

A female patient, aged sixty, was examined in 1942, sixteen years after a bilateral chordotomy performed at the level of the 3rd and 4th thoracic vertebræ. At the time of operation there was complete anæsthesia to pain on the right side, over the entire lower limb and the abdomen up to the eighth thoracic division, and on the left side up to the inguinal region. Sixteen years later, pain perception was present all over, and appreciation of heat variations was fairly good. Thus it would appear that a long time after chordotomy, sensation to pain may reappear in regions previously insensitive.

#### PAIN FOLLOWING NERVE INJURIES

A diffuse burning pain can be caused by injury to a nerve without loss of motor power, as in small wounds of the finger when there has been injury to a digital nerve. Likewise in wounds of the anterior aspect of the wrist, with or without a cut tendon, a lateral wound of the median nerve may be overlooked. In all such cases the pain is reflex from the neurogliomatous tissue of the scar, and this must be attended to without the need for any operation to restore continuity of the nerve.

At times pain may be localized to the region of the nerve involved, at others it may be diffused over areas supplied by adjacent nerves. Such pain diffusion may be abolished by sympathetic block, which confines the pain to the region of the nerve or nerves involved. If a nerve is caught in the scar tissue, this nerve must always be explored. Neurolysis alone, however, is not always successful, and it is advisable to carry out paravertebral sympathetic blocks or a periarterial sympathectomy in addition. Should the adjacent artery be thrombosed, this must be resected. Most commonly a lateral or central neuroma is present. If the pain is accompanied by paralytic phenomena, then a wide neurectomy with restoration of the nerve continuity is indicated. When no paralysis is present, however, the decision is difficult, particularly in regard to the median or sciatic nerve. Lateral neurectomy, or simple removal of the neuroma, is as a rule inadequate in these cases, and resection and suture of the nerve may be necessary. The nerve continuity must always be restored. So long as a scar remains on the nerve, sympathetic operations are not satisfactory. At times during the course of regeneration of a nerve, or following such regeneration, intense pain may occur. Such pain can be relieved by injections of novocain into the nerve or by sympathetic block.

#### CAUSALGIA

Two types of causalgia must be recognized:—(1) No injury is present, either

nervous or arterial. In most cases, repeated infiltration of the stellate ganglion brings relief within a few weeks. In resistant cases section of the branches of origin of the vertebral nerve, above the stellate ganglion, gives good results, and this method seems preferable to ganglionectomy, which in some instances has caused exacerbation of the pain. Section of the preganglionic fibres may also be carried out, and as a rule relief is obtained thereby.

(2) There is a nerve injury alone, a nerve injury associated with an arterial injury, or an arterial injury alone. The injured nerve must always be repaired and its continuity restored. As regards the arterial injury, often the artery is found to be severed and the ends thrombosed. The ends must be resected and the ideal method would be to use vessel grafting for the restoration of arterial continuity. This method will be possible in the future, but in the meantime, when an arterial thrombosis is present but there is no injury to the nerve, arteriectomy without any nerve operation will give relief of long duration. In unsuccessful cases section of the roots of the vertebral nerve or of the preganglionic fibres is indicated.

#### PAIN OF VASCULAR ORIGIN

Pain is very often due to vasomotor disturbances (vasoconstriction or passive vasodilatation). This can be proved by a paravertebral block with novocain, used in some cases for the purpose of diagnosis, in others as a form of therapy, and this test will indicate whether or not sympathectomy is likely to prove beneficial. A traumatic or spontaneous *thrombosis of a large artery* may be the origin of pain in some instances. I have seen a case in which an old-standing thrombosis of the subclavian was the cause of pain in the hand, with intermittent attacks of ischæmia. Excision of the thrombosed segment resulted in relief which still continues after thirteen years. In certain cases of cervical rib, arteriectomy gives relief from pain.

Elderly patients with *arterial disease* causing obstruction of the superficial femoral or external iliac arteries can usually be relieved of their pain in two or three days by resection of the obliterated segment, and such relief may be of long duration (10, 11 and 13 years). Lasting relief from pain has also been obtained by resection of the terminal aorta, with or without lumbar sympathectomy.

In *thromboangiitis*, ganglionectomy of the 3rd and 4th ganglion on one side and of the 1st and 2nd on the other has given relief in 75 per cent. of cases, without always affecting the intermittent claudication, but in 25 per cent. of cases the pain persists. When the site of pain is near an ulcerated toe, adrenalectomy may give relief, and also resection of the obliterated segment of artery after this has been determined by an arteriogram. Some cases, however, may prove resistant to every form of treatment—to neurotomy of the sensory nerves of the leg and foot, to posterior radicotomy (L4-5, S1-2), and even to median commissural myelotomy (1 failure). The patients complain of a burning vice that squeezes their ankle, and finally amputation becomes necessary because of the intense pain when the foot

is warm. Following amputation the ulceration heals and the condition of the skin seems good, but such patients usually experience "phantom limb" pain after amputation.

#### ANGINA PECTORIS

For the crises of angina pectoris which do not respond to medical treatment, there are now several modern methods of surgical treatment available: various ganglionectomies, posterior root section, coronary neurectomy with ligation of the great coronary vein, revascularization of the myocardium, alcohol blocks of the thoracic ganglia. It is not yet possible to choose the best from among these many methods, but it is certain that repeated blocking of the stellate ganglion with novocain relieves a great number of patients with angina pectoris, and particularly if stellate block is combined with block of the left splanchnic nerve. Some relief is usually obtained after the first novocain block, and the treatment generally reduces the severity of the attacks. Excision of the stellate ganglion, particularly bilateral excision, has given relief of long duration (7 and 9 years) in 35 per cent. of cases, and approximately the same results can be obtained by transthoracic ganglionectomy. The whole question of the treatment of anginal attacks is in a state of evolution.

#### PAIN FOLLOWING AMPUTATIONS

In this condition, two types of pain must be differentiated, i.e., the pain localized in the stump, and the pain in the absent limb. The prognosis for the two types of pain is different—the former is easier to relieve than the latter. Unfortunately, as time goes on the pain becomes a combination of both types—the patient complains of pain in the part of the limb which still remains and also in that which has been amputated. In painful stumps which are associated with œdema and trophic disturbances, sympathetic operations have proved very successful; periarterial sympathectomy has given relief of eight and six years' and eighteen months' duration. If the artery is obliterated, however, arteriectomy is preferable to periarterial sympathectomy: relief of six years' duration has been obtained by this method. Root section and ganglionectomy have produced cures of ten, eight-and-half and two-and-a-half years' duration.

With regard to pain in the absent limb, it would seem logical to consider division of the sensory tracts in the cord, but the results of such interventions are uncertain and they cannot be recommended. Minor methods should be tried for as long as possible: repeated injections of vitamin B, X-ray therapy, and especially sympathetic block. With repeated sympathetic blocks many patients obtain relief and life becomes bearable, apart from a few slight transitory pains: in some instances relief has been obtained for years (14½, 8 and 6 years). If operation finally seems to be indicated, resection of a neuroma must never be carried out, nor must re-amputation be considered even if the stump is uneven. Both these operations have resulted in many failures, and often the patient has been made worse:

the neuroma always reappears and both operations may lead to changes in the sensory tracts in the spinal cord. It is preferable to procure re-innervation of the neuroma by remote section followed immediately by suture to restore continuity of the nerve. Cures of ten, seven and two years' duration have been obtained by this procedure, but there have also been many failures. Extensive posterior radicotomy has seldom resulted in cure (50-75 per cent. failures). Some advocate chordotomy, others reject this procedure—the results are certainly inconstant. Median commissural myelotomy has resulted in only one good result in five cases. On the basis of these results it is therefore tempting to assume that a cerebral factor plays a part in cases of phantom limb pain, which leads to the idea of excision of the sensory centres and prefrontal leucotomy. Results of these operations are not yet numerous enough to support a definite opinion, but their possible use must be borne in mind in connexion with resistant and long-standing cases.

#### OTHER ASPECTS OF PAIN

It is only possible in a brief review to mention a few of the many examples of pain that may be abolished or relieved by surgical means.

*Pains in the arm*, arising in the shoulder but diffusing over the whole limb, often have their origin in calcification of the supraspinatus tendon or subacromial bursa, and can be relieved immediately by novocain injection at this point. Small scars in the pulp of the fingers, often following punctured wounds, may give rise to pain that radiates to the whole upper limb. Treatment in the form of local novocain injection should be instituted early; if it is too late for this, repeated block of the stellate ganglion or the second thoracic root may be carried out.

*Radiodermatitis* may give rise to intolerable pain. The best treatment is extensive excision followed by skin grafting. When multiple lesions of the fingers make excision and grafting impossible, periarterial sympathectomy has produced good results by abolishing the pain and allowing the ulcers to heal, but the likelihood of malignant changes in the skin and of radio-necrosis in the bones must always be borne in mind.

Pain in ligaments following sprains, and acute pains of muscular origin, very often respond immediately to the local injection of novocain. Sciatica is traced with increasing frequency to herniation of an intervertebral disc.

#### CONCLUSION

A brief résumé of surgical methods available for the relief of pain of organic and non-organic origin is given. Some of these measures are still in a state of evolution; many, on the other hand, have definitely proved their worth. The novocain infiltration of painful areas, nerves and muscles, whilst demanding the most careful diagnosis and technique, is one of the more simple surgical procedures for the amelioration, and in many instances cure of pain that through recent advances in knowledge has been added to the armamentarium of the surgeon.

# REVISION CORNER

## VULVO-VAGINITIS IN CHILDREN

VULVO-VAGINITIS may be either *primary* due to local causes or *secondary* as part of a generalized infection. Parental anxiety and nursery tradition have accentuated the part played by local infections, especially gonococcal, in its causation. Both in hospital and in private practice the incidence of vulvo-vaginitis is mostly due to the staphylococcus which has appeared first as a "boil", "carbuncle" or similar lesion elsewhere in the body. The streptococcus is much less common, but is found accompanying sore throats, aural discharges and nasal infections. Other infections such as the *B. coli* occur in vaginal discharges in cases of acute and subacute appendicitis, whilst acute pyelitis in children commonly produces an acute vulvo-vaginitis.

It is well known that some of the specific fevers may present problems during the prodromal stage, especially chickenpox, scarlet fever and measles—in fact any catarrhal condition affecting the mucous membrane of the mouth, nose, throat, ear and nasal sinuses may be (and frequently is) accompanied by a catarrhal involvement of the vaginal and endocervical mucous membranes.

It is just a matter of chance to which region the attention of the child's mother is first drawn. Theoretically, the problem of diagnosis should be easy. Descriptions are given of clinical appearances of the various infections, and a vaginal swab and material taken for culture should clinch the diagnosis. In practice, however, the more cases that are seen the less dogmatic the clinician becomes, especially as it is not always easy to examine a screaming child in its own home with anxious parents hovering around. Reports on films may be vague, and the presence of mixed organisms obscures the main cause. Accurate diagnosis is, however, absolutely essential, for the treatment of vulvo-vaginitis is the treatment of the cause.

### GNOCOCCAL VULVO-VAGINITIS

Let us consider first the infection which is uppermost in the minds of the parents and others, and the most suspected in any police court case, i.e., the gonococcus. This organism though, as previously mentioned, not the most common cause of vulvo-vaginitis in children, does present certain characteristic signs. The vaginal discharge is yellow, but has a definite greenish tinge, the vulva is excoriated, and frequency of micturition may be marked. Smears taken from the vulva or from inside the vagina show large numbers of extracellular and intracellular diplococci, morphologically resembling the gonococcus, and even if cultural methods available do not confirm this, it is usually safe to consider and treat the child as suffering from gonorrhœa. There are several important aspects of the treatment.

(1) *General hygiene* and especially the prevention of spread of infection to others and re-infection of the child itself when cured. To accomplish this, it is essential to discover the causal factor, which is more commonly one or both parents, a nurse-maid, or a lodger in the house in whose bed the child perhaps has been accustomed to play. Accidental infection is far the most common, and on the whole criminal assault is rare. It is sometimes forgotten that the theory that the gonococcus does not readily survive is a false one, and purulent material deposited on linen aprons, sheets and the like can remain potentially infective for some days. Re-infection by children's knickers and chamber utensils is common, so that unless the parents are very conscientious and well informed, the chances of carrying out really careful hygiene in the average home are small.

(2) Frequent *sea-salt baths* prevent the child from getting too sore locally, and rest in bed between the baths is helpful in the acute stage.

(3) The administration of *penicillin* is more effective and less toxic than any of

the sulphonamide drugs. Penicillin may be given locally in the form of vaginal pessaries (500 units each) inserted twice daily for ten to fourteen days, or intramuscularly, 20,000 units three-hourly for 5 doses. The latter is probably the easiest (also the more extravagant) and when penicillin is scarce local applications to the vagina produce good results. During treatment the complement fixation test for gonorrhœa must be watched and used also as a test for cure. Tests should be stringent and consist of the absence of clinical or pathological signs after a month's cessation of treatment and again two weeks later. Finally, a fortnight afterwards 0.25 c.cm. of gonococcal (London Lock Hospital) vaccine is injected overnight and tests taken the next day. If clear, then, and then only, is the child considered cured and may be sent home (assuming that the lady almoner in the meantime has "followed up" all the sources of infection in the child's home).

#### OTHER CAUSAL FACTORS

Vulvo-vaginitis is sometimes due to *foreign bodies* in the genital tract, and recently a metal lip-stick container had to be removed per abdomen in a child of nine who had suffered from a blood-stained discharge of over a year. When vulvo-vaginitis is considered to be *secondary to infection* elsewhere, treatment should be directed to removal of the cause, e.g. tonsillectomy, treatment of urinary infections, and so on; and it is usually sufficient to confine local treatment to frequent baths and the application of a soothing cream.

Infants suffering from *ophthalmia neonatorum* may exhibit a moderate degree of vaginal discharge, but this does not require any local treatment as the cessation of the eye discharge usually coincides with the clearing up of the vulval signs.

Finally, the application of any irritant solutions to the genitalia of children should greatly be deprecated, and should always be avoided.

GLADYS M. SANDES, M.B., B.S., F.R.C.S.

### PREGNANCY IN DIABETES MELLITUS

It is now agreed that heredity plays an important part in the etiology of diabetes, but the view that the disease is always inherited as a Mendelian recessive characteristic, although widely held in America, is not generally accepted in this country. The possible occurrence of diabetes in the children of diabetic parents must, however, be borne in mind when deciding whether pregnancy should be encouraged or prevented in any particular case. In the present state of ignorance of the exact mode of transmission of diabetes it is impossible to lay down hard and fast rules, but it is probably safe to say that if husband and wife are both diabetics the chance of transmitting the disease is great and pregnancy should be discouraged; if one partner is a diabetic and there is a family history of diabetes in both, the danger, although possibly less, is considerable. The presence of a strong history of diabetes in the family of the diabetic partner only, constitutes a problem which rarely presents itself unless the prospective mother is the diabetic, and cannot be solved without consideration of such other factors as parity, temperament and severity of the diabetes. Apart from heredity, the most important factors in deciding whether a diabetic woman should have a family or not are her willingness and ability to cooperate with her doctor at every stage of the pregnancy. In this connexion it is important to remember that ability to cooperate will depend not only upon the patient's intelligence but also, to some extent, upon the accessibility of a suitable hospital or clinic where the patient can be kept under observation and to which she can be admitted for delivery.

The great improvement in the control of maternal diabetes rendered possible by the proper use of insulin has resulted in a reduction in maternal mortality from a high figure to one comparable with that obtained in normal pregnancy; this is in marked contrast to the foetal mortality which, although less than it was before the



discovery of insulin, has remained remarkably high. The death of the child *in utero* or shortly after delivery is generally due to "poor viability", excessive size, hypoglycæmia or congenital abnormality, and is said to be associated with a high incidence of toxæmia of pregnancy in the mother. The term "poor viability" is difficult to define but the clinical picture indicated must be familiar to all who have had much experience in this branch of medicine. The baby is often described by the midwife as "lazy" and "lifeless" and great difficulty may be experienced in getting it to breathe satisfactorily, attacks of severe cyanosis being common and sometimes fatal. Excessive size, the so-called "giant baby", is possibly the result of maternal hyperglycæmia or over-secretion of anterior pituitary hormone and may lead to death from injury or exhaustion in the course of a long and difficult labour. Hypoglycæmia is probably a rare cause of death and can be prevented in the manner described under "Practical Management". Congenital abnormalities appear to be more common in the offspring of diabetic than of normal mothers but no satisfactory reason for this has been put forward.

Toxæmia of pregnancy is greatly stressed in America as an important cause of foetal and neonatal death, but I have been unable to confirm this view in a series of some 100 diabetic pregnancies. Good results are claimed by White *et al.* by treatment of the mother with increasing doses of œstrogen and progesterone in the later months of pregnancy, but this work awaits confirmation. There does, however, appear to be an important relationship between foetal mortality and the degree of control of the maternal diabetes; this is well illustrated by the results obtained in a series of 54 diabetic pregnancies reported by Lawrence and Oakley, in which the foetal death rate in fully controlled cases was 23 per cent., as against 70 per cent. in those in which the diabetes was uncontrolled.

#### PRACTICAL MANAGEMENT

For the first six months the patient should be seen once a month, or more frequently if the diabetes is not satisfactorily stabilized. In the early months there is usually no need to change the pre-pregnancy treatment except to ensure that the diet contains an adequate supply of vitamins and mineral salts, especially calcium and iron, by the addition if necessary of extra milk and an iron preparation such as fersolate. The insulin dosage in these early months as a rule requires little or no modification although, as pregnancy progresses, it tends to rise in the majority of cases, a progressive fall in insulin requirement during pregnancy being exceptional.

After the sixth month the patient should be seen every fortnight, and from then onwards a close cooperation maintained between physician and obstetrician. The physician's aim should be to control the diabetes as carefully as possible so as to avoid long periods of hyperglycæmia without causing hypoglycæmic attacks, a task rendered more difficult by the lowering of the renal threshold to sugar which occurs in most cases during the second half of pregnancy. This means that the urine contains sugar even when the blood sugar is normal or only slightly raised, and makes urine tests unreliable as a guide to insulin requirement, which can only be assessed by blood sugar determinations. Although the presence of sugar in the urine may be of little significance, especially during the later months, the presence of acetone bodies, as shown by Rothera's test, is of the greatest importance and should be regarded as a danger signal; a positive ferric chloride test indicates severe ketosis and means that the patient's diabetes requires urgent treatment. Ketosis is apt to develop quite rapidly in pregnant diabetics as a result of vomiting, a temporary increase in the severity of the diabetes and loss of sugar due to the lowered renal threshold. Severe degrees of ketosis are best treated by admitting the patient to hospital or a nursing home and giving soluble insulin (S.I.) and carbohydrate every four or six hours until Rothera's test is negative; milder degrees can be dealt with by increasing the insulin and, if necessary, the carbohydrate intake. Patients on a

mixed dose of S.I. and protamine zinc insulin (P.Z.I.) may be given a small dose of the former before tea or supper, whilst those on two doses of S.I. are often greatly improved by the addition of a little P.Z.I. to the evening dose.

The aim of the obstetrician should be to arrange that the baby is born before it has become too large, but not until it is well developed and fully viable, a task again rendered more difficult by the not uncommon occurrence of hydramnios, which makes accurate assessment of the size of the foetus far from easy.

It is generally agreed that the foetal survival rate is highest if pregnancy is terminated between the 36th and 38th week, but there is some difference of opinion as to the best method of delivery. Caesarean section seems to give the lowest foetal mortality in primiparae, but induction is often worth trying in those cases which have had a previous normal delivery. If for any reason sterilization is indicated, Caesarean section has the advantage of avoiding a subsequent operation.

After delivery the mother's insulin almost always falls steeply for a few days, but later rises again to somewhere about the pre-pregnancy level; there is therefore no reason to fear that the diabetes will be made worse by pregnancy, although a somewhat higher insulin dose may be necessary until after the puerperium.

In order to avoid the risk of the baby developing hypoglycaemia it is wise to give two-hourly feeds of glucose in water for the first twenty-four hours, the interval between the feeds being increased to four hours during the second day, by which time breast or artificial feeding will have been instituted and the need for glucose removed. Breast feeding should be attempted as early as possible and every effort made to encourage the mother to feed her baby. The supply of milk, however, is often subnormal in diabetics, and test-feeding should therefore be carried out as a routine, any deficiency being corrected by supplementary feeds. Apart from the possible danger of hypoglycaemia after delivery and the difficulties often associated with breast feeding, the management of the baby born to a diabetic mother differs in no way from that of any other child.

WILFRID OAKLEY, M.D., F.R.C.P.

### CORNS AND CALLOSITIES

*A callosity* is a yellowish, or brown, dome-shaped solid prominence which merges gradually into the surrounding skin. It consists of a circumscribed hypertrophy of the horny layer of the skin. Callosities result from intermittent pressure or friction at a particular site and may form at any point on the body surface which is subject to chronic trauma. They are therefore a common occupational stigma, for instance on the palms of the hands in gardeners, blacksmiths and other manual workers, or on the tips of certain fingers in violinists and harpists. Callosities frequently form on the soles, heels and plantar borders of the feet or, for instance, over the head of the first metatarsal in hallux valgus, where the callosity may contribute to the development of a bunion.

*A corn* (clavus) is also a local traumatic hyperkeratosis but differs from a callosity in having a more sharply defined base and by the presence of a horny peg which projects downwards deeply into the corium. The boring pain characteristic of a corn is due to the pressure of this conical plug on the underlying sensory nerve-endings; corns, however, as most people know, often ache spontaneously or with changes in barometric pressure.

Corns are virtually confined to the feet, occurring especially over relatively acuminate bony prominences which have merely a thin cutaneous covering, such as over the phalangeal articulations of the toes. Interdigital or so-called soft corns are mostly ordinary corns which have become softened as a result of warmth, sweat and maceration. Corns are traditionally ascribed to ill-fitting shoes, which may be either too tight or too loose. The basic cause, however, is often an anatomical defect in the bony architecture of the foot. In some cases the pathogenesis is not easily

discovery of insulin, has remained remarkably high. The death of the child *in utero* or shortly after delivery is generally due to "poor viability", excessive size, hypoglycæmia or congenital abnormality, and is said to be associated with a high incidence of toxæmia of pregnancy in the mother. The term "poor viability" is difficult to define but the clinical picture indicated must be familiar to all who have had much experience in this branch of medicine. The baby is often described by the midwife as "lazy" and "lifeless" and great difficulty may be experienced in getting it to breathe satisfactorily, attacks of severe cyanosis being common and sometimes fatal. Excessive size, the so-called "giant baby", is possibly the result of maternal hyperglycæmia or over-secretion of anterior pituitary hormone and may lead to death from injury or exhaustion in the course of a long and difficult labour. Hypoglycæmia is probably a rare cause of death and can be prevented in the manner described under "Practical Management". Congenital abnormalities appear to be more common in the offspring of diabetic than of normal mothers but no satisfactory reason for this has been put forward.

Toxæmia of pregnancy is greatly stressed in America as an important cause of foetal and neonatal death, but I have been unable to confirm this view in a series of some 100 diabetic pregnancies. Good results are claimed by White *et al.* by treatment of the mother with increasing doses of œstrogen and progesterone in the later months of pregnancy, but this work awaits confirmation. There does, however, appear to be an important relationship between foetal mortality and the degree of control of the maternal diabetes; this is well illustrated by the results obtained in a series of 54 diabetic pregnancies reported by Lawrence and Oakley, in which the foetal death rate in fully controlled cases was 23 per cent., as against 70 per cent. in those in which the diabetes was uncontrolled.

#### PRACTICAL MANAGEMENT

For the first six months the patient should be seen once a month, or more frequently if the diabetes is not satisfactorily stabilized. In the early months there is usually no need to change the pre-pregnancy treatment except to ensure that the diet contains an adequate supply of vitamins and mineral salts, especially calcium and iron, by the addition if necessary of extra milk and an iron preparation such as fersolate. The insulin dosage in these early months as a rule requires little or no modification although, as pregnancy progresses, it tends to rise in the majority of cases, a progressive fall in insulin requirement during pregnancy being exceptional.

After the sixth month the patient should be seen every fortnight, and from then onwards a close cooperation maintained between physician and obstetrician. The physician's aim should be to control the diabetes as carefully as possible so as to avoid long periods of hyperglycæmia without causing hypoglycæmic attacks, a task rendered more difficult by the lowering of the renal threshold to sugar which occurs in most cases during the second half of pregnancy. This means that the urine contains sugar even when the blood sugar is normal or only slightly raised, and makes urine tests unreliable as a guide to insulin requirement, which can only be assessed by blood sugar determinations. Although the presence of sugar in the urine may be of little significance, especially during the later months, the presence of acetone bodies, as shown by Rothera's test, is of the greatest importance and should be regarded as a danger signal; a positive ferric chloride test indicates severe ketosis and means that the patient's diabetes requires urgent treatment. Ketosis is apt to develop quite rapidly in pregnant diabetics as a result of vomiting, a temporary increase in the severity of the diabetes and loss of sugar due to the lowered renal threshold. Severe degrees of ketosis are best treated by admitting the patient to hospital or a nursing home and giving soluble insulin (S.I.) and carbohydrate every four or six hours until Rothera's test is negative; milder degrees can be dealt with by increasing the insulin and, if necessary, the carbohydrate intake. Patients on a

Much has been written about the normal fantasy of childhood. It is a universal phenomenon and must be regarded as normal. It is only when a child's fantasy is mistaken for reality by that child that it can be regarded as pathological. In night terrors the displacement of reality by fantasy in a state of semiconsciousness must be regarded as a symptom of disease of psychological origin. The causes of the psychological disease must be looked for in the family history and the environmental history of the child. A history of psychological disturbances in parents or sibs and a history of insecurity and unhappiness in the child's home life will usually be found.

*Precipitating causes.*—In the past, stress was laid upon precipitating causes. Still regarded respiratory obstruction by large tonsils and adenoids, digestive disturbances caused by dietetic indiscretion, constipation, and threadworms as the most common causes of night terrors. Cameron found hypoglycæmia in cases of night terrors and treated the condition with success with glucose at night. In many "nervous" or "anxiety" conditions hypoglycæmia has been found and is supposed to be caused by the overaction of the adrenals which is a part of the condition. With the swing of the pendulum towards the psychological side of psychosomatic disease, however, these somatic causes have lost stature, and emphasis has been laid upon the psychological causes. Nevertheless, when these conditions coexist with night terrors they should be treated, and at the same time therapy logically directed to the underlying causes.

*Age:* The usual age of onset is between five and eight years. Still describes one case of only ten months as the earliest and one child of fifteen as the latest in a series of 150 cases.

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#### DIFFERENTIAL DIAGNOSIS

Still's description gives an accurate word picture of the attack, and when this is seen, difficulty in diagnosis does not arise. More often, however, the practitioner has to rely upon hearsay, for the child has no recollection of the attack. Here by close questioning a distinction may be drawn between "night terrors" and "nightmares". This may be made by reference to the appearance of wakefulness and the time of onset. For in night terrors the child appears awake and the onset is shortly after going to bed, and in nightmares the child is asleep and dreaming, though he may subsequently wake, and the time of onset is usually during a period of light sleep or just before waking up.

Epilepsy, occurring only at night, is the most important major disease from which a differential diagnosis may have to be made. Here help may be obtained from the description of the epileptic seizure, which if complete with involuntary movements is characteristic, and from the fact that children do not pass water during night terrors (only 1 in 150 cases), nor do they fall into a deep sleep after the attack as is so commonly the case after major epilepsy. Finally, the distinction can be made by the abnormal curves shown by the epileptic upon the electro-encephalogram, which may be the only method of distinguishing epileptic equivalents without convulsions from night terrors.

The delirium which accompanies pyrexia in childhood must be excluded, and this must be done by temperature recording and a careful search for infection.

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explained, and corns have been observed in early life on feet which have never been enclosed in tight shoes. There also seems to be an individual proclivity to corn formation.

Corns are sometimes confused with plantar warts ("verrucae"), although the latter are a proved virus infection and are quite different histologically. In the differential diagnosis it may be helpful to remember that a corn is an avascular structure composed of compressed horn which can be shaved away layer by layer, whereas a plantar wart, although its surface may be somewhat cornified from pressure, is a relatively soft, spongy, vascular, usually globular, invaginated tumour, which cannot be pared down in the same fashion and which generally is extremely painful on central probing.

#### TREATMENT

A callosity may be reduced or softened palliatively by keratolytics, such as salicylic acid ointment (10 to 20 per cent.), but the lesion is essentially a defensive and protective reaction of the integument and hence the only radical treatment is removal of the cause.

For the average corn regular paring with a sharp knife and extraction of the so-called core with the point, combined with the use of a circular felt pad having a central aperture to relieve pressure, is usually sufficient. Alternatively, the corn may be scraped away after preliminary softening for a few days with salicylic acid ointment or salicylic collodion (1:5). Such cases are best dealt with by a registered chiropodist. It must be remembered, however, that corns easily become secondarily infected and when this occurs a local cellulitis may be set up which may lead to ascending lymphangitis and regional adenitis. Therefore on this account corns should not be carelessly cut but should be treated with some respect and dealt with as a minor surgical procedure under aseptic technique. Such precautions, of course, apply particularly to corns occurring in diabetics or in those with poor peripheral circulation or arteriosclerosis.

In more severe cases, in which a bony mal-alignment may be present, the help of an orthopaedic surgeon must be obtained. Apart from radical operative correction of hammer-toe or other bony or articular deformity, the corns themselves may require excision together with any underlying exostosis.

E. W. PROSSER THOMAS, M.D.

### NIGHT TERRORS IN CHILDHOOD

OLDER writers are consistent in their description of this complaint. Thus Still (1938), describing it as the most impressive of sleep disturbances in childhood, says: "The staring eyes that gaze at some terrifying vision but show no recognition of realities around, the shrinking, trembling child, perhaps starting up in bed or crouching in a corner of the room with the sweat of terror upon his forehead, the scream of agonized fear lest the horror he sees reach him, the imploring cry 'Take it away' 'Don't let it come'. All make one of the most distressful scenes. But it is all forgotten in the morning". It would be foolish to attempt to add to this graphic description. A little elaboration is all that is necessary.

It is this fright with the appearance of wakefulness, but without the ability to recognize reality, that distinguishes "night terrors" from "nightmares", for in the latter the child is asleep and there is no appearance of wakefulness.

*Underlying causes.*—The underlying causes are psychological. The same hereditary and environmental influences which combine to produce the "nervous" child, and the "neurotic" adult are at work here: on the one hand the innate difficulty experienced by such persons in adapting themselves to their environment, and on the other hand the insecurity and, in this case particularly, the unhappiness of that environment.

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## TREATMENT

As has already been said, this should be directed primarily to the underlying causes. An attempt should be made to help the child to adapt himself to his environment or to modify that environment, in particular by pointing out the causes to the parents and getting them in so far as is possible to remove the feeling of insecurity and the unhappiness. Precipitating causes should be dealt with as and when they arise.

Sedation plays little or no part in the treatment, except as a placebo, or when used as an ancillary to psychological treatment.

## PROGNOSIS

It is rare for the condition to persist for longer than a few weeks at a time so that the prognosis for the immediate condition is good, but the true prognosis of the individual rests upon the underlying causes and this will vary with the severity of the psychological upset. Should "night terrors" persist for longer than a few weeks it is possible that grave psychological disease exists.

R. E. BONHAM CARTER, M.B., CH.B., M.R.C.P.

## Reference

Still, G. F. (1938): "Common Happenings in Childhood", London.

## NOTES AND QUERIES

*Diet in Renal Failure*

QUERY.—I would be most grateful to receive a diet chart suitable for the following case. My difficulty is that the diet recommended by the physicians and surgeons who have seen the patient (another medical practitioner) have so restricted each others' diet that bread, potatoes and water seem to be all that is left. The case is one of congenital septum of the bladder having caused back-pressure on both kidneys, which are hydronephrotic (one moderate, the other markedly) with occasional pyonephrosis. The urine contains albumin, pus and casts intermittently. Blood urea approximately 60-70 mgm. per cent. Heart and lungs are normal as is the blood pressure. The patient is forty-five years of age. The diet which I have in mind is intended to keep calorie requirements up to the level required for a quiet sedentary life (the patient is carrying on in general practice), with an adequate vitamin content if possible. If suitable weights of the foods allowed are included it would help. The patient is fond of fruit but has found that oxalate-producing fruits are apt to produce urinary irritation.

REPLY.—My opinion is that diet has little effect in this type of case. The essentials are: plenty of fluid, and the avoidance of foods rich in oxalates such as strawberries, rhubarb, spinach, beetroot and tomatoes; otherwise the diet should be of the ordinary mixed type. Occasionally patients with this degree of renal failure feel better on a vegetarian diet. My experience is that the restriction of protein rarely has effect on the blood urea.

HORACE EVANS, M.D., F.R.C.P.

*The Treatment of Ulcerative Colitis*

QUERY.—I should be glad if you could refer me to any recent advances in the treatment of ulcerative colitis with any suggestions for maintaining the hæmoglobin of the patient at a reasonable level, as iron in any form upsets the whole condition.

REPLY.—There is still no satisfactory treatment of ulcerative colitis. A course of penicillin and sulphaguanidine, by destroying some of the secondary bacterial invasion of the ulcers, may do good but this treatment is in no sense specific. Morton Gill has suggested the use of an extract from hogs' intestinal mucosa but this does not constantly provoke a remission and has proved disappointing. Thiouracil has recently been suggested. Myxœdematous patients are, of course, often constipated and, by producing a degree of hypothyroidism, thiouracil may inhibit intestinal activity and reduce the diarrhœa. I have only seen it do good when it was pushed to this extent and a definite goitre resulted. This does not seem a very practicable form of treatment but is warranted if there is any suggestion of hyperthyroidism; it must, however, be given with the usual precautions. The anemia in ulcerative colitis is due to loss of blood, secondary malnutrition and infection. It can usually be treated successfully with transfusions of packed cells in the first instance, and maintenance of a normal or nearly normal blood level with as nutritious a diet as possible, containing animal protein, adequate vitamins, and small doses of iron. Iron is usually tolerated as ferrous sulphate if it is given in very small doses after meals and slowly worked up to the

usual dose of 3 to 5 grains (0.2 to 0.32 gm.). If there is lenteric diarrhoea, dilute hydrochloric acid 30 to 60 minims (1.8 to 3.6 c.cm.) in water with meals, may stop it. Treatment of the anaemia is an essential part of therapy as healing of the ulcers can hardly be expected to occur in its presence.

W. I. CARD, M.D., F.R.C.P.

### *The Treatment of Myasthenia Gravis*

QUERY.—I have under my care a boy of six suffering from myasthenia gravis since February 1947. Prostigmin as a therapeutic test is positive. For months the boy has been kept on large doses of prostigmin administered orally and parenterally. Deep X-ray therapy on the thymus has been tried without avail. I would like to know if there are any other drugs or measures which can be recommended.

REPLY.—The best treatment of myasthenia gravis by drugs is a combination of prostigmin and ephedrine. Ephedrine prolongs the effect of prostigmin. Doses of 5 to 15 mgm., two or three times a day, are suitable for a boy of six. Other drugs sometimes used as adjuvants are guanidine hydrochloride and potassium chloride. Guanidine hydrochloride has an effect like that of prostigmin although much less powerful. It can be given in doses of 10 to 30 mgm. per kgm. of the patient's weight, in three or four divided doses daily. Toxic effects are loss of appetite, nausea, colic, diarrhoea, tingling of the extremities and nervousness. Potassium chloride prolongs the effect of prostigmin when it is wearing off. It may be given in doses of 5 to 10 gm. up to three times a day, but should not be taken for long periods without an interval. It may cause slight nausea, diarrhoea and diuresis. Potassium glyconate may be given instead of the chloride. D.F.P. (di-isopropyl-fluorophosphonate) is another drug which relieves the symptoms of myasthenia gravis. It is much less powerful and more toxic than prostigmin and at present is used mainly for research.

Thymectomy has now been done in many cases of myasthenia gravis. Remissions have often followed, but varying in degree and occurring at varying intervals after the operation. It is difficult to assess the value of this operation at present owing to the natural remissions of the disease. The best results are obtained in early cases and it is in these that natural remissions are most common. The operation should only be performed by an expert thoracic surgeon with

a staff accustomed to dealing with myasthenia gravis. The mortality used to be very high but has now been reduced to about 3 per cent. in the best hands. Irradiation, if it completely atrophies the thymus, should have the same effect on myasthenia gravis as thymectomy.

MARY WALKER, M.D., M.R.C.P.

### *Ultra-Violet Rays and Influenza Prophylaxis*

QUERY.—What is a suitable dose of ultra-violet rays for continuous administration by total exposure by means of a Quain lamp, one carbon with iron ore, to increase resistance to very mild influenza in an allergic patient? Five consecutive doses have been administered, one per week, the first three of five minutes and the last two of eight minutes, with apparent aggravation of attacks.

REPLY.—There is no conclusive scientific evidence that continuous administration of ultra-violet rays increases the resistance to influenza. Patients vary over fairly wide limits in their reaction to ultra-violet light from any given source. Therefore the only satisfactory way of determining dosage is to undertake a test exposure for each patient. This is done by cutting holes about the size of a penny on a piece of black paper such as is used for encasing X-ray films and placing the paper on part of the body not normally exposed to natural sunlight, such as the abdomen. The holes in the paper are given varying exposures with the lamp at a fixed distance, commonly 3 feet from the patient, in order to determine what exposure produces a just visible erythema when the irradiated areas are inspected twelve hours later. This is the first-degree erythema reaction time for the particular patient. Treatment consists in irradiating the patient at the same distance for this time in the first instance and increasing the exposure by 25 per cent. on alternate days up to twelve to eighteen exposures. It is advisable to expose the back and front of the patient alternately. It is not clear whether the reference to the case being "allergic" refers to undue sensitivity to sunlight or allergy to foreign proteins. If the former, the starting dose should be half the first-degree erythema reaction time and the increments reduced to a level which produces not more than a first-degree erythema reaction. For fuller details standard textbooks on actinotherapy should be consulted.

D. S. COOKSEY, O.B.E., M.D.



## PRACTICAL NOTES

### *Intolerance to Drugs in Asthma*

THE tendency for asthmatic subjects to show intolerance to drugs is emphasized by J. L. Morgan and L. E. Prickman (*Proceedings of the Staff Meetings of the Mayo Clinic*, September 3, 1947, 22, 391). Of 17 consecutive patients with asthma, seen over a two-month period, 12 either gave a history of previous abnormal reactions to drugs, or experienced such reactions while under treatment. The drugs to which these patients gave abnormal reactions included aspirin, morphine, barbiturates, bromides, iodides, chloral, iodized oil, aminophylline, benadryl, pyribenzamine hydrochloride, and sulphanilamide. The reactions observed in this series were divided into true drug allergy, intolerance, overdosage, and side-effects. A true allergic response may occur immediately on taking a drug; it rarely occurs more than two hours after administration. The most frequent example of drug allergy is that following the ingestion of acetylsalicylic acid; this occurred in five of the 17 patients in this series. Intolerance to drugs is the most common finding, particularly to morphine and codeine, and the statement is made that "without question it [morphine] is a dangerous drug to use in asthma and one which courts catastrophe". Iodides are also liable to be tolerated badly, even in small doses. They usually produce a papular rash or congestion of the salivary glands. Overdosage is most likely to occur with the barbiturates because many remedies for asthma and hay fever contain barbiturates, and without realizing this, practitioners are apt to prescribe barbiturates in order to allay anxiety or to encourage sleep. It is urged that patients who have asthma should be "carefully questioned about previous reactions to drugs of any and all types, and each asthmatic patient must be observed closely for early evidence of such intolerance. The use of the drug or drugs responsible must be meticulously avoided".

### *Folic Acid in Liver-Refractory Anæmia*

THREE cases of liver-refractory macrocytic anæmia in which a satisfactory response was obtained by folic acid, are reported by J. Waldenström (*Blood*, September 1947, 2, 426). One was a case of hypochromic anæmia which gradually became hyperchromic and then, after responding well to liver extract for 12 years, became refractory to liver. The second was a case of idiopathic steatorrhæa with macrocytic anæmia, and the third was a case of pernicious anæmia. All three responded well to the oral

administration of folic acid in doses ranging from 25 to 100 mgm. daily. A fourth case is also recorded: a case of idiopathic steatorrhæa, with a slightly hyperchromic or normochromic anæmia and probable atrophy of the spleen, which was resistant to both liver extract and oral folic acid.

### *Treatment of Lightning Pains*

ON the basis of his experience in eight cases, W. Fowler (*British Journal of Venereal Diseases*, June 1947, 23, 90) recommends, the symptomatic treatment of lightning pains by infiltrating the affected skin areas with a local anæsthetic. Both 2 per cent. novocain (2 to 4 c.cm.) and proctocaine (1 to 2 c.cm.) were used, but a more prolonged effect was obtained with the latter. For instance, with novocain the pain returned in one to four hours, whereas with proctocaine relief was maintained for at least two to four days. When the pain struck at a fixed point, the involved area of skin was infiltrated. When the pain travelled from a fixed point, the skin was infiltrated as close as possible to this point. In the case of girdle pains the skin was infiltrated across the path of the pain on both sides of the trunk. When the pain was diffuse, as in the foot, the affected area was blocked by infiltration round the ankle. The advantages claimed for this method of treatment are: (1) ease of performance; (2) immediate relief; (3) no need for sedatives; (4) the patient can carry on his work.

### *Prognosis of Poliomyelitis*

WITH the object of gaining a view of the prognosis of poliomyelitis, observation and follow-up of 117 cases at the Helsingki City Hospital for Communicable Diseases during the period 1937-42 have been carried out by A. Arvola (*Annales Medicinæ Internæ Fennicæ*, 1947, 36, 211). The following facts were noted:—Among the paretic cases the majority were males (57 per cent.). The ages of the patients ranged from nine months to forty years, the age of the male patients at the time of onset being distinctly higher than that of the female patients. The disease was as frequent among adults as among children, and was less severe in children than in adults. At the time of the follow-up in 1946, ninety-five of the 117 paretic patients were alive; nineteen died in the acute stage of the disease and three died after leaving hospital, from other causes. The fatality rate was 10 per cent. females, and 21 per cent. males. The average age of the patients who died was 21.9

years; as the average age of all the patients in the series was 15.7, it is shown that the mortality is higher among adults than among children. The immediate cause of death was paralysis of a circulatory centre. In 17 per cent. of the follow-up material recovery had progressed so well that there were no symptoms of paresis; in 24 per cent. defects were quite slight and practically harmless, and in 18 per cent. the defects were mild. In 27 per cent. invalidism was from 30-70 per cent., and in 14 per cent. from 70-100 per cent. Complete invalidism was present in 3 per cent. As regards capacity for work, of 55 patients over the age of eighteen, 48 (87 per cent.) were able to work and support themselves, 31 per cent. being capable of heavy work. Joint contracture and flaccid joint were the most usual deformities in children, and scoliosis of the spine in adults. The best results were observed in patients who had been continuously under medical supervision.

### Colloidal Iron or Ferrous Sulphate?

BECAUSE it is "widely known that the iron salts now in use may result in unpleasant side-reactions which may restrict or hinder adequate treatment", R. C. Batterman et al. (*American Journal of Medical Sciences*, September 1947, 214, 268) have investigated the relative values of colloidal ferric hydroxide and ferrous sulphate. In a preliminary series of six patients they investigated the daily percentage of iron utilization, giving colloidal iron hydroxide by mouth in doses of 75 to 150 mgm. thrice daily (75 mgm. is said to be equivalent to 39 mgm. of metallic iron or 107 mgm. of anhydrous ferrous sulphate). The daily utilization of iron was found to range from 3 to 27.7 per cent., which is said on the average to be equivalent to experiences with 200 to 400 mgm. of ferrous sulphate thrice daily. In a second series of six patients with hypochromic anaemia, colloidal ferric hydroxide was found to produce a satisfactory response in four; in the remaining two patients higher dosage was required. The question of gastro-intestinal irritation was investigated in a group of 107 patients; of these, 91 patients received colloidal ferric hydroxide, and 106 received ferrous sulphate. Both preparations were administered orally as tablets. Symptoms or signs of gastro-intestinal irritation were noted in 12 per cent. of those receiving the colloidal preparation, and in 24 per cent. of those receiving ferrous sulphate. The most frequent disturbance was constipation, but among those receiving ferrous sulphate, vomiting occurred in one patient and abdominal colic in four. Neither vomiting nor colic occurred in

any of the patients receiving the colloidal preparation. It is concluded that: "Colloidal iron hydroxide is an effective preparation for the treatment of hypochromic anaemia. Its daily iron utilization, although equivalent to ferrous sulphate, is achieved with a smaller dose. The incidence and severity of gastro-intestinal complaints noted with its use are less than with ferrous sulphate".

### Intra-Articular Penicillin in Acute Arthritis

THE use of intra-articular injections of penicillin in cases of acute arthritis is recorded by G. Costa Bertani (*Revista de la Asociacion Medica Argentina*, August 15, 1947, 61, 587). The dosage of penicillin employed was 5000 to 20,000 units, using 10,000 units per c.cm. In those cases in which synovial fluid was present, this was first withdrawn and then the penicillin injected immediately, using the same syringe. Intramuscular and intravenous injections of penicillin were given in conjunction. In some cases penicillin injections alone were employed; in others different forms of treatment were given in addition. In view of the rapid improvement following the penicillin injections, however, this was considered to be the potent factor.

### Rose Hip Syrup

A PLEA for the wider use of rose hip syrup is made by W. P. Kennedy (*Pharmaceutical Journal*, October 4, 1947, 159, 250), who deprecates the habit of certain pharmacists in still restricting the sale of this preparation for use in young children. Supplies are now such that there is no longer any reason for restricting its use to any one particular class of patient. Attention is drawn to the fact that it is claimed to be of value in the treatment of bronchitis. It is also suggested that more work should be done to assay its content of vitamin P, as, if this is at all appreciable, rose hip syrup may be of value in the treatment of gastric ulcer. This suggestion is based upon the reports that blackcurrant purée is beneficial in this condition, and this action has been attributed to the vitamin P content of the purée. Among the methods recommended for taking rose hip syrup are: neat, in milk puddings, on bread, diluted with water, or beaten up with milk. Yet another "particularly acceptable" method is with yoghurt. Attention is drawn to the widespread use of rose fruits throughout Europe, e.g., as jams and paste in the Balkans, and as candies in Russia.

## Nervous Reactions Following Typhoid-Tetanus Vaccination

G. DE MORSIER (*Revue Médicale de la Suisse Romande*, September 25, 1947, 57, 607) records nine consecutive cases of abnormal reactions to recent typhoid-paratyphoid-tetanus (T.P.T.) vaccination. In three cases the reaction was in the form of a post-vaccinal encephalitis (in one case with a conjoint cervical radiculitis), the onset of symptoms being after the second, first and third injections respectively; in the fourth case symptoms of poliomyelitis affecting the arms and right shoulder appeared after the first injection and were intensified after the second. A control examination three months after the first injection showed persistence of the atrophy and paralysis. This patient was strong and healthy before receiving the injections of T.P.T. In the fifth case lumbo-sacral radiculitis developed after the second injection and became intensified after the third. The sixth was a case of post-encephalitic Parkinsonism which was definitely aggravated by one injection of T.P.T. In the seventh case a trembling of the head of two years' duration became worse after the first injection, the hands also being affected. The second injection was well tolerated, but after the third the condition was markedly aggravated and the symptoms persisted. This patient was a soldier who had previously been able to carry out his civilian and military duties without hindrance. In the eighth and ninth cases there was recurrence of arthritis. In both these cases the condition had been entirely cured before the administration of the T.P.T. vaccine, one for a period of three years and the other for five years. In the summary the author comments on the variation in the latent period between the injection and the onset of symptoms, which varied from a few hours to ten days in the recorded series.

## A Simple Test for Viability of Strangulated Bowel

ATTENTION is drawn by M. E. Lichtenstein (*Journal of the American Medical Association*, September 27, 1947, 135, 221) to the value of the inhalation of 100 per cent. oxygen in determining the viability of strangulated bowel. Should blood be circulating through the wall of the affected part of the bowel, this is shown by an immediate change from a dusky colour to a bright pink colour following the inhalation of 100 per cent. oxygen. It is also stated that inhalation of oxygen assists in recovery of the affected segment, as it diminishes or abolishes

vascular spasm; this effect can often be noted as the vascular pulsation becomes fuller and more vigorous. Therefore if following the inhalation of oxygen there is neither change of colour nor appearance of vascular pulsation, then the probability is that the affected segment is non-viable. Stress is laid upon the fact that like all other similar tests, this one must only be interpreted in conjunction with all the other available clinical data.

## Baldness and Body Hair

THE relationship between baldness and the degree of hirsuties has been investigated by H. Harris (*British Journal of Dermatology and Syphilis*, August-September 1947, 59, 300) in a series of over 1,000 consecutive normal men between the ages of twenty-four and forty-two years. All were white subjects and born in Great Britain. Axillary and pubic hair, as well as facial hair, were not included in the investigation, and body hair was taken to include that on the chest, abdomen, legs and arms. Cases of alopecia areata, cicatricial alopecia, traumatic alopecia and other gross pathological disorders were excluded. It was found that baldness occurred more frequently in persons with a relatively heavy growth of hair on the body than in those with only a scanty growth. The following table summarizes the relevant figures:—

GROWTH OF BODY HAIR

	Scanty %	Moderate %	Heavy %
Normal population ..	41.8	51.8	6.4
Bald population ..	21.8	59.2	19.0

## Flavouring Paraldehyde

ACCORDING to *The Journal of the American Pharmaceutical Association* (July 1947, 8, 366) the Florida Bureau of Professional Relations, conducted from the University of Florida School of Pharmacy, is recommending the following formula for an emulsion of paraldehyde:—

Tragacanth .. ..	0.5 gm.
Paraldehyde .. ..	45.0 c.cm.
Distilled water .. ..	20.0 c.cm.
Fluid extract of liquorice ..	8.0 c.cm.
Syrup .. ..	10 120.0 c.cm.

Each teaspoonful contains about 2 c.cm. of paraldehyde. To improve the flavour it is recommended that each dose should be administered well diluted with iced water or chilled fruit juice. It is also said that preliminary cooling of the mouth by a cold drink is helpful in disguising the characteristically unpleasant flavour of the paraldehyde.

## REVIEWS OF BOOKS

*Diseases of the Joints and Rheumatism.* By KENNETH STONE, D.M., M.R.C.P. London: Wm. Heinemann (Medical Books) Ltd., 1947. Pp. vii and 362. Figures 68 and 16 coloured plates. Price 30s.

THIS scholarly presentation of the writer's views on the many aspects of the rheumatic problem is of outstanding interest because it is based upon his wide clinical experience in that particular branch of the medical art. The first and larger portion of the book is devoted to a consideration of joint disorders, many of which by no definition of the term can be regarded as rheumatic. Their inclusion is fully justified by the fact that a failure to recognize a tuberculous joint, for example, constitutes one of the numerous pitfalls into which the careless diagnostician may slip. The latter part of the book deals with the various non-articular manifestations which the author designates as "rheumatism," thus reverting to the older nomenclature. The three opening chapters on vagotonic muscular rheumatism are admirable examples of clear thinking; they are at once illuminating and provocative and should act as a stimulant to further research on these lines. The illustrations both plain and coloured are excellent and the same may be said about the reproductions of the X-ray films which add greatly to the usefulness of the work. This is a book that should be read by all students and practitioners whether engaged in the practice of this branch of the profession or not.

*Recent Advances in Clinical Pathology.*

EDITED BY S. C. DYKE, D.M., F.R.C.P.

London: J. & A. Churchill Ltd., 1947.

Pp. 468. Price 25s.

THIS textbook has been produced under the auspices of the European Association of Clinical Pathologists, an idea which took shape towards the end of world war II. Its contents comprise sections on bacteriology, biochemistry, hæmatology, and histology under the respective editorships of Robert Cruickshank, E. N. Allott, B. L. Della Vida, and A. H. T. Robb-Smith. In all, forty authors contribute some forty-one chapters. Foreign authors include Deliktova, Friedmann, Pick, Rodan and Waelsch of Prague; Della Vida of Rome, and Van Den Ende of Cape Town. The contents of the book are well distributed in the four main sections, and each subject matter is dealt with by an author well known in his particular field. Thus Sinclair deals with nutritional deficiencies, King with biochemical methods, Mollison with the

Rh factor, Brewer with blood groups and transfusions, and Robb-Smith with biopsies. The book is well illustrated and references are given at the end of each chapter. In future editions a note on insulin tolerance tests, the diagnostic value of 17-ketosteroid excretion, and thiouracil therapy, would be of value.

*Medicine.* Vol. I. BY A. E. CLARK-KENNEDY, M.D., F.R.C.P. Edinburgh: E. & S. Livingstone Ltd., 1947. Pp. xii and 383. Price 20s.

THIS is a tantalizingly disappointing book. The intention is excellent—to present a picture of the practice of medicine as a study of the whole man and not merely as a tabulation of the symptoms and signs of individual diseases. Unfortunately the high hopes raised by the preface are not maintained in the subsequent text. There are many, both teachers and taught, who will agree with the author that "the textbook of to-day is either a compilation of second-hand facts or a symposium of disconnected subjects written by a panel of authors" and that there is a crying need for a reorientation of the teaching of medicine. The art of medicine, so long the glory of British medicine, is rapidly becoming a lost art, and largely because our medical schools are producing a generation of practitioners who know nothing of logic, philosophy or the humanities. As an attempt to retrieve the situation before it is too late Dr. Clark-Kennedy's book is welcome, even though his attempt has not been wholly successful, and this for two main reasons. First, there is too much repetition and verbiage. The author allows himself to be carried away and to be led into long philosophical dissertations which are not strictly relevant to the subject under discussion. Secondly, in his attempt to systematize symptoms and signs (a wholly admirable idea) he either goes further than the facts justify, or tends to give an erroneous impression. A particularly glaring example of this (too long to be quoted here) will be found on pp. 51-52. Other examples are the statements: "The pulse is rather out of fashion. It is not worth while bothering about the pulse too much"; "This [a complete physical examination] is a tedious business, part of the hack work of medical practice". The style of the book is also not above criticism. A book, the preface of which is written from "London and Cambridge" has no justification for using "tubercular" when "tuberculous" is meant, referring consistently to "aneurisms", mis-spelling pH and referring to "streps" and "staphs". These criticisms may

appear unduly severe, but it is only fair to judge the work by the high standards the author has deliberately set himself. Any criticism is bound to be difficult in view of the fact that this is merely the first volume of a two-volume work which has been published independently of its fellow-volume, which is to be devoted to the application in practice of the concept of medicine outlined in this first volume. All who are genuinely interested in the problem of medical education will await this second volume with interest.

*The Psychology of Women. Vol. 2: Motherhood.* BY HELENE DEUTSCH, M.D.  
London: Research Books Ltd., 1947.  
Pp. vii and 439. Price 25s.

THE psychopathology of women's disorders has attracted very little authoritative writing. This is surprising since it is admitted by all that women may develop physical symptoms as a result of emotional disorders from puberty onwards, and mental disorders are well known to occur. This book is the second part of a study of women, of which Vol. I, "Girlhood", was published last year. It is written more simply and clearly than many Freudian books, indeed Dr. Deutsch differs in some points from her master: the manner in which she stresses the tension between the feminine-passive and masculine-aggressive impulses and the conflict between the tendency to give or to take, is admirable. Only the psychiatrist can be expected to follow all the arguments, but it is so clearly presented that the book should command a far greater public. Not only are there chapters upon pregnancy, delivery, lactation and the menopause, but upon problems of conception, the mother-child relation, unmarried mothers, adoptive mothers and stepmothers; and one might wish for one on the important matter of mothers-in-law. As might be expected Dr. Deutsch, who recognizes the endocrine component in sterility and in abortion, suggests how big a part is played by the psyche in such difficulties. She has written clearly, and suggestively about these distressing difficulties. If she does not create optimism as regards the facile treatment of such obstacles, the classifications are enlightening and she stimulates searching questions about the way in which our present culture may be creating more, rather than fewer, difficulties. It is only too apparent that the age in which young married couples begin their adventure in such cramped accommodation as their parents or their friends can afford them, or in which all strata of society seeks to take rather than to give, and impulsive marriages are so common, tend to increase

rather than to minimize the psychological difficulties of motherhood, and of love-making. Thus we would agree with Dr. Stanley Cobb's foreword to Volume I that Dr. Deutsch's study "is important to all of us, whether we happen to be parents, teachers, authors or psychiatrists", and we would add gynaecologists and general practitioners.

*Mental Health: A Practical Guide to the Disorders of the Mind.* BY JOHN H. EWEN, F.R.C.P.Ed., D.P.M. London: Edward Arnold & Co., 1947. Pp. 266.  
Price 12s. 6d.

THIS book is for beginners. A bird's-eye view of the field of clinical psychiatry is presented in orthodox descriptive form. This is preceded by chapters on psychopathology, symptomatology and classification, and is followed by a medico-legal review, a chapter on the special features of mental hospital work, a glossary, a short general bibliography and an index. To condense so much matter and maintain a good balance within the compass of 266 pages is, as the author recognizes, difficult. The general arrangement is good, but not everyone will agree that the allotment, for example, of nearly seven pages to classification, two to psychological testing and just over one to the rôle of inheritance in causation is appropriate. Such a book must be didactic, but statements such as "... heredity plays a dominating part in the ætiology of mental illness"; "the diagnosis of dementia paralytica is made in the laboratory"; "paraldehyde . . . may be given in a single dose of 1 drachm per stone body-weight", need more qualification than they get here. The legal definition of "moral defectives" is incorrectly stated on p. 224. Misprints are too frequent; it is difficult to accept such looseness as (p. 108) "... the frontal lobes of the corvex"; presumably intended to refer to the cortex of the frontal lobes.

*The Child from Five to Ten.* BY ARNOLD GESELL, M.D., and FRANCES L. ILLG, M.D. London: Hamish Hamilton Medical Books, 1947. Pp. xii and 475.  
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THIS is a companion volume to two earlier books "The First Five Years of Life", and the "Infant and Child in the Culture of Today". It is based on the most careful and painstaking observation of children at the Yale Clinic of Child Development over a period of many years. Gesell describes the book as a biographic developmental study of the patterning of behaviour throughout the first ten years of life.

The development of ten major fields of behaviour—motor characteristics, personal hygiene, emotional expression, fears and dreams, sexual life, interpersonal relations, play life, school life, ethical sense, and philosophical outlook are traced through seventeen age levels. It is packed with valuable information about normal development, as are all the other books by Gesell, but, like all his books, it is difficult to read. It cannot fail to be of value to all concerned with child health, and should be read by workers in this field on account of the many valuable observations which it contains.

*Kompendium der Parasitischen Würmer im Menschen.* BY HANS A. KREIS. Basle: Benno Schwabe & Co., 1947. Pp. 136. Figures 70. Price Sw. frs. 10.

This book, although comparatively small, is comprehensive and should prove to be of considerable advantage both to the laboratory worker and the clinician in the diagnosis and treatment of parasitic infections. The arrangement is admirable. In the general part of the book there is an account of the history and development of parasitism, the adaptation of the invader to a parasitic existence and the effects produced upon the host. The second portion deals with the diagnosis of helminthiasis, the recognition of parasites, their ova and larvae, the methods of examination of faeces, urine and other pathological material, including the effect upon the blood picture and serological diagnosis with regard to the individual parasites. The tables and illustrations are good and should prove most helpful for diagnosis in the clinical laboratory. This is a useful book and an English translation would be of value.

*The Doctor's Job.* BY CARL BINGER, M.D. London: George Allen & Unwin Ltd., 1946. Pp. 243. Price 12s. 6d.

This eminently readable book by an American physician will appeal to many British readers. In a crisp, wise-cracking style it reviews some of the problems of modern medicine, such as the doctor-patient relationship, the province of the specialist, medical ethics, "socialized medicine", and so forth. The author has few pet aversions, and in his own words "no doctrinaire schemes for salvation have been offered up, but instead I have tried to emphasize what constitutes good medical care". The book is never dull and is often lit up with arresting phrases, as in the definition of psychosomatic medicine: "that newly hatched but venerable baby", and the advice to those considering the future practice of medicine: "do not be deceived into believing

that a system of easy payments will solve the problem of good medical care or that it can emerge out of a political football scrimmage". Both as a picture of modern medical practice as seen through the eyes of an enlightened impartial practitioner, and as a commentary on the trend of medicine this book can be thoroughly recommended.

#### NEW EDITIONS

AMONG the additions to *Surgery: A Textbook for Students*, by Charles Aubrey Pannett, B.Sc., M.D., F.R.C.S., in its second edition (Hodder & Stoughton Ltd., 27s. 6d.) are sections on the continuous intramuscular administration of penicillin, the use of heparin and dicoumarol for the prevention of post-operative thrombosis, the injection method for the relief of pain in nerve affections and injuries, the surgical treatment of patent ductus arteriosus—these are but a few of the many attractive features of the new edition of a work which admirably fulfils the high standard set by the author in his original preface: "There are so many textbooks of surgery that the issue of another can only be defended if it has qualities of its own tending to ease the already heavy burden of the undergraduate student".

THE second edition of *Gynecology*, by Lawrence R. Wharton, PH.D., M.D. (W. B. Saunders Company, 50s.), which contains a section on female urology with a chapter on water cystoscopy, has been brought up to date in all sections. A separate chapter has been devoted to the female urethra; and in the chapter on sterility the subject of artificial insemination is included. Penicillin and the sulphonamides in the treatment of gonorrhoea and other infective conditions are among the many advances incorporated in the new edition, which is richly illustrated with beautifully produced figures, some in colour.

THOROUGH revision has been undertaken in the preparation of the fifth edition of *A Handbook of Diseases of Children*, by Bruce Williamson, M.D., F.R.C.P. (E. & S. Livingstone Ltd., 15s.) although less than two years have elapsed since the publication of the fourth edition. The ever growing use of penicillin, which has revolutionized the treatment of meningitis, pneumonia and many other diseases of childhood, has been the author's chief reason for revision, and in addition to its inclusion in the chapters dealing with individual diseases a new section on penicillin therapy has been included in the formulary. This little work is too well known to call for detailed criticism, but practitioners will find it up to date in all sections.

appear unduly severe, but it is only fair to judge the work by the high standards the author has deliberately set himself. Any criticism is bound to be difficult in view of the fact that this is merely the first volume of a two-volume work which has been published independently of its fellow-volume, which is to be devoted to the application in practice of the concept of medicine outlined in this first volume. All who are genuinely interested in the problem of medical education will await this second volume with interest.

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# THE PRACTITIONER

*Edited by*

SIR HENEAGE OGILVIE

K.B.E., D.M., M.Ch., F.R.C.S.

*and*

WILLIAM A. R. THOMSON

M.D.



*July—December 1947*

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1947

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## EDITORIAL ANNOUNCEMENT

*The Practitioner* is pleased to announce that, beginning with the January 1948 number, its distribution on the North and South American Continents will be undertaken by the well-known firm of Charles C Thomas, publisher, of Springfield, Illinois. Dr. Robert Stecher, of the Western Reserve University School of Medicine, Cleveland, will undertake the duties of Associate Editor in the United States, and will be responsible for promoting the exchange of American and British ideas that is so much desired by readers in both hemispheres.

## NOTES AND PREPARATIONS

### N.A.P.T. CHRISTMAS SEALS

THE money obtained from the sale of these gaily coloured little seals is used to carry on education and research and for welfare work connected with the care of tuberculous patients and their families. This year's emblem, which is particularly attractive, is the generous gift of



MERRY CHRISTMAS

the Canadian Tuberculosis Association to the N.A.P.T. Each seal bears the double-barred red cross, the international emblem of the fight against tuberculosis. Seals are on sale at a cost of 4s. per 100, and can be obtained from the Duchess of Portland, Chairman of the N.A.P.T., Tavistock House North, Tavistock Square, London, W.C.1.

### MEDICAL FILMS

At a film show at the Air Ministry Cinema, Whitehall, S.W.1, on October 30, four films of medical interest were exhibited: "Patent Ductus Arteriosus", the record of an operation at the Hillingdon Hospital; "Prevention of Tuberculosis in Hospitals", an American film; "Diphtheria Trailer No. 10", which is now being shown in cinemas at the end of news-reels; and "Your Children's Meals", the fifth film in the "Your Children" series. Copies of this last film and also of "Patent Ductus Arteriosus" will shortly be available in 35 mm. and 16 mm. (sound) sizes from the Central Film Library, Imperial Institute, South Kensington, London, S.W.7. Arrangements can also be made for the showing of "Your Children's Meals" through the Central Office of Information mobile film units on application to the Film Officer at the appropriate C.O.I. Regional Office (addresses from the C.O.I. Films Division, 83 Baker Street, London, W.1).

### PUBLICATIONS

*When You Are Old* is the report of the Committee set up by the British Medical Association in 1946 to find out what reforms were needed in the care of old people, as the basis of a plan for

the institution of geriatric wards in hospitals, long-stay annexes, and residential homes for the homeless aged and those too frail to manage homes of their own. Copies of the booklet, which is most attractively compiled, can be obtained from B.M.A. House, Tavistock Square, London, W.C.1, price 1s. *Proprietary Medicine—Facts*, a booklet published by the Proprietary Association of Great Britain, provides a brief review of the organization of the industry in this country and the rules whereby its constituent members control the advertising of their preparations. *The Social and Legal Aspects of Sexual Abnormality*, by Edward Glover, M.D., is the third pamphlet published by the Institute for the Scientific Treatment of Delinquency, 8 Bourdon Street, Davies Street, London, W.1, price 1s. *Medical Group Practice in the U.S. (Planning No. 274)* gives an account of the development of medical group practice in U.S.A., which in view of the inauguration of health centres under the National Health Service Act should be of much interest to practitioners. Copies are obtainable from P E P, 16 Queen Anne's Gate, London, S.W.1, price 2s. post free.

### Editorial Notes

#### PAIN AND ITS PROBLEMS

THE concluding article in this series on "The Appraisal of Pain", by Lord Moran, which was announced to appear in this issue, will be published in an early number next year.

#### CURRENT THERAPEUTICS

THIS will be the title of a new series of special articles to be published during 1948. The first article in the series will be "Folic Acid", by Professor L. J. Davis.

#### BINDING CASES

BINDING cases for volume 159 (July-Dec. 1947), in green cloth with gilt lettering, are now available, price 4s., post free, from *The Practitioner*, 5 Bentinck Street, London, W.1.

THE contents of the January 1948 issue, which will contain a symposium on "Diet and Nutrition", will be found on page lxx at the end of the advertisement section.

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